# Nigeria

# Primary Maths

## Gr 3

## Teacher's guide

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# Contents

# How to use this course

## Features of the Pupil's Book

The *New General Mathematics* Primary 3 Pupil's Book consists of 32 units. Each unit starts with a list of objectives, or commonly known as performance objectives (as listed in NERDC, 2013), that will be covered in each unit.

In addition, the exercises in the Pupil's Book have been carefully developed to ensure integration of the performance objectives from the curriculum, and a steady progression of skills throughout the year.

It is important that you follow the order of the units, especially for related sub-topics, as units build on the knowledge and skills acquired in preceding units.

The units follow a 'teach and practise' approach:
- New concepts are explained and given context in their meaning.
- Worked-through examples show pupils how to approach problem solving.
- Exercises allow pupils to practise on their own.
- Revision exercises round off each unit as a mixed exercise covering all the problems addressed in the unit.

Summative assessment activities are provided at the end of every term in the form of Term assessments, along with a term project. These assessments test pupils on all the knowledge and skills they have gained in each term, and the projects enable the pupils to apply the work they have learnt in practice.

Additional features include:
- **Key words:** Key terminology is highlighted for the pupils. Definitions are given in the Pupil's Book and in the Teacher's Guide.
- **Puzzles:** Additional problems, usualy in a real-life context to help grow an appreciation of mathematics in everyday life.
- **Challenges:** extension problems for stronger pupils to attempt. These exercises generally extend the scope of content covered in each unit.
- **Teaching notes:** advice and ideas for teachers in dealing with the content on each page.

## Features of the Teacher's Guide

This *New General Mathematics* Primary 3 Teacher's Guide is lesson-based. The units of the Pupil's Book are organised into a series of lessons. Units include most of the following features:
- The performance objectives from the curriculum that are covered in the unit.
- A list of suggested resources you will need
- Definitions for the key words in the Pupil's Book, as well as some additional key words and their descriptions
- Frequently asked questions relating to teaching the unit's content (not always applicable)
- Common errors pupils make (not always applicable)
- An evaluation guide showing the key learning milestones.

Each lesson includes the following:
- **Preparation** for the lesson (all the suggested resources) – remember, these can be tailor-made to suit the requirements of your classroom situation
- A **starter activity**, which helps you focus on the topic, or revise previous required knowledge
- **Lesson focus**, which suggests how you should teach the lesson, and the main strategies you can incorporate
- **Answers** to all exercises, puzzles and challenges in the Pupil's Book and Workbook
- **Assessment** guidance on how to effectively assess pupils in each lesson
- **Extension activities** (not always applicable)
- Suggestions for **homework activities**, where necessary.

**Note:** The lesson-based guidelines are *suggestions* only. You, as the teacher, will need to assess how much your pupils are able to cover in each lesson.

## Features of the Workbook

The *New General Mathematics* Primary 3 Workbook provides a worksheet for every unit in the Pupil's Book. Pupils use these worksheets

to practise the specific mathematical skills and concepts covered in each unit. It forms as a consolidation of the pupils' understanding and is a useful resource for homework assignments.

Pupils can record their answers and calculations in the spaces provided on each of the worksheets. The answers to these worksheets are all provided in the Teacher's Guide.

## Methodology

Mathematics teaching and learning goes beyond reaching the correct answer. Many mathematical problems have a range of possible answers. Pupils need to understand that Mathematics is a *tool* for solving problems in the real world; not just about giving the correct answers.

The Mathematics classroom must therefore provide an environment in which problem-solving is seen as integral to the teaching programme, and where learning activities are designed to provide pupils with opportunities to think.

Working mathematically involves:
- questioning
- applying strategies
- communicating
- reasoning
- reflecting.

Pupils will require some, or all of the above processes, to make sense of any mathematical concept.

Problem-solving strategies include:
- trial and improvement
- acting it out
- making a model
- drawing a diagram or picture
- looking for patterns
- working backwards (inverse operations)
- using tables and data
- making a list.

Primary level 3 focuses primarily on building and strengthening the first five strategies listed above, and then in the later primary levels, builds on the other strategies.

Alongside developing these problem-solving strategies, it is important for pupils to gain specific mathematical knowledge as tools for problem-solving. At Primary level 3, these tools include:
- counting, reading and writing numbers from 0 to 999
- working with place value in three-digit numbers
- ordering numbers using < and > symbols
- working with fractions (in halves, one-third and one-quarter)
- ordering fractions using < and > symbols
- adding two-digit numbers with exchanging or renaming
- adding three-digit numbers
- adding three numbers together, two at a time
- adding fractions with a common denominator
- subtracting two-digit numbers with exchanging or renaming
- subtracting three-digit numbers
- subtracting three numbers together, two at a time
- subtracting fractions with a common denominator
- working with multiplication (1 × 1 to 9 × 9; 2-digit by 1-digit numbers; three 1-digit numbers, taking two at a time)
- working with division (by 2, 3, 4, 5 and 6 up to and not greater than 48 without remainders; distinguish between multiples and factors)
- working with open sentences and word problems
- working with money (changing money not exceeding ₦20 into smaller units; using addition, subtraction and simple multiplication when working with money)
- working with length (measure the length and perimeter of objects and spaces in metres and centimetres)
- telling the time (in hours and minutes) and giving dates in days and months
- working with and comparing the weight of objects (in grams and kilograms)
- working with capacity (in litres), and measuring liquid
- working with symmetry (identify and draw shapes of symmetry, and state their properties; distinguish between curves and straight lines)
- reading and representing information in pictograms (identifying the mode)

# Curriculum Matching Chart

| NERDC Topic | Performance Objective | Pupil's Book Unit | PB Page | WB Page |
|---|---|---|---|---|
| **Theme 1: Number and numeration<br>Sub-theme: Whole numbers** | | | | |
| 1. Whole numbers up to 999 | 1. Count correctly numbers up to 999 | Unit 1 Counting and writing up to 999 | 8 | 5 |
| | 2. State the place value of a digit in a 3-digit number | Unit 2 Place value | 12 | 6 |
| | 3. Order whole numbers and use the symbols < and > | Unit 3 Ordering and comparing whole numbers | 14 | 7 |
| | 4. Mention the need for counting and ordering | | | |
| **Theme 1: Number and numeration<br>Sub-theme: Fractions** | | | | |
| 2. Fractions | 1. State fraction of a group of concrete objects | Unit 4 Fractions of shapes | 18 | 9 |
| | 2. Divide shapes in $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$, etc. | | | |
| | 3. Write fractions which have the same value as a given fraction | Unit 5 Equivalent fractions | 22 | 10 |
| | 4. Use the symbols < or > to order fractions | | | |
| **Theme 2: Basic operations<br>Sub-theme: Basic operations** | | | | |
| 1. Addition | 1. Add 2-digit numbers with exchanging or renaming | Unit 6 Adding two-digit numbers with exchanging or renaming | 26 | 12 |
| | 2. Add 3-digit numbers | Unit 7 Adding three-digit numbers | 28 | 13 |
| | 3. Add 3 numbers taking two at a time | Unit 8 Add three numbers together | 32 | 14 |
| | 4. Add fractions with the same denominator | Unit 12 Adding fractions | 50 | 18 |
| | 5. Mention the need for correct addition of numbers and fractions in everyday activities | | | |
| 2. Subtraction | 1. Subtract 2-digit numbers with exchanging or renaming | Unit 9 Subtracting two-digit numbers with exchanging or renaming | 36 | 15 |
| | 2. Subtract 3-digit numbers | Unit 10 Subtracting three-digit numbers | 38 | 16 |
| | 3. Subtract 3 numbers taking two at a time | Unit 11 Subtract three numbers together | 42 | 17 |
| | 4. Subtract fractions with the same denominator | Unit 13 Subtracting fractions | 52 | 19 |
| | 5. Mention the need for correct subtraction of numbers and fractions in everyday activities | | | |
| 3. Multiplication | 1. Multiply from 1 × 1 to 9 × 9 | Unit 14 Multiplying two-digit numbers | 54 | 20 |
| | 2. Multiply 2-digit number by 1-digit number | | | |
| | 3. Multiply three 1-digit numbers taking two at a time | Unit 15 Multiplying three one-digit numbers | 58 | 21 |
| | 4. Carry out correct multiplication in everyday activities | | | |

| NERDC Topic | Performance Objective | Pupil's Book Unit | PB Page | WB Page |
|---|---|---|---|---|
| 4. Division | 1. Divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 without remainder | Unit 16 Dividing whole numbers without remainder | 62 | 22 |
| | 2. Express whole numbers not exceeding 48 as products of factors | Unit 17 Factors and multiples | 66 | 23 |
| | 3. Find a missing factor in a given number | | | |
| | 4. Distinguish between factors and multiples | | | |
| | 5. Carry out correct division in everyday activities | Unit 16 Dividing whole numbers without remainder | 62 | 22 |
| **Theme 3: Algebraic processes**<br>**Sub-theme: Open sentences** | | | | |
| 1. Open sentences | 1. Find missing number in an open sentence | Unit 18 Open sentences | 72 | 25 |
| | 2. Identify the relationship between addition and subtraction | | | |
| | 3. Solve related quantitative aptitude problems | | | |
| **Theme 4: Mensuration and geometry**<br>**Sub-theme: Primary measures** | | | | |
| 1. Money | 1. Change money not exceeding ₦20 into smaller units | Unit 19 Changing money | 76 | 26 |
| | 2. Shop effectively with money not greater than ₦20 using the idea of addition and subtraction | Unit 20 Shopping with money | 78 | 27 |
| | 3. Perform simple multiplication involving money with product not exceeding ₦20 | Unit 21 Multiplying money | 82 | 29 |
| 2. Length | 1. Measure the length and/or width of room, table, building and straight edged materials, etc. | Unit 22 Measuring and comparing lengths (non-standard measures) | 84 | 30 |
| | 2. Mention importance/benefits of standard units of measurement | Unit 23 Measuring and comparing lengths (standard measures) | 92 | 31 |
| | 3. Find perimeters of regular figures in metres and centimetres by measurement | Unit 24 Perimeter | 98 | 33 |
| | 4. Identify perimeter of regular shapes in their environment | | | |
| 3. Length II | 1. Compare their non-standard measures e.g. arm's length | Unit 22 Measuring and comparing lengths (non-standard measures) | 84 | 30 |
| | 2. Identify the differences in the non-standard measures | Unit 23 Measuring and comparing lengths (standard measures) | 92 | 31 |
| | 3. Use metres and centimetres as standard measuring units | | | |
| | 4. Identify the need for lengths and measurement using standardized units | | | |
| 4. Time | 1. Say time accurately in hours and minutes | Unit 25 Time | 102 | 35 |
| | 2. Give dates in day and month | Unit 26 Calendars | 106 | 36 |
| | 3. Mention the importance of time in daily life activities | | | |

| NERDC Topic | Performance Objective | Pupil's Book Unit | PB Page | WB Page |
|---|---|---|---|---|
| 5. Weight | 1. Measure weights of objects in grams and kilograms | Unit 27 Measuring and comparing weights | 110 | 37 |
| | 2. Make meaningful comparison of weight of objects like rocks, minerals | | | |
| | 3. Appreciate the need for grams and kilograms as standard units of measure for transactions | | | |
| **Theme 4: Mensuration and geometry<br>Sub-theme: Secondary measures** | | | | |
| 1. Capacity | 1. Identify litre as a unit of measuring capacity | Unit 28 Capacity | 114 | 38 |
| | 2. Measure liquid e.g. water using a graduated cylinder up to any stated number of litres | | | |
| | 3. Identify the need for accuracy in measuring liquids e.g. kerosene, water, petrol, etc. | | | |
| **Theme 4: Mensuration and geometry<br>Sub-theme: Shapes** | | | | |
| 1. Symmetry | 1. Identify shapes with line(s) of symmetry | Unit 29 Line of symmetry | 120 | 39 |
| | 2. Identify lines of symmetry in everyday life | | | |
| | 3. State properties of squares, rectangles and triangles | Unit 31 Squares, triangles and circles | 128 | 42 |
| | 4. Identify that some shapes in everyday life are square, rectangular, triangular and circular and therefore see mathematics in everyday life | Unit 30 Curves and straight lines | 124 | 40 |
| | 5. Distinguish between curves and straight lines | | | |
| | 6. Identify the presence of straight lines and curves in real-life situations | | | |
| | 7. Draw squares, rectangles, triangles and circles | Unit 31 Squares, triangles and circles | 128 | 42 |
| **Theme 5: Everyday statistics<br>Sub-theme: Data collection and presentation** | | | | |
| 1. Pictograms | 1. Read and represent information in pictograms using vertical and horizontal arrangements | Unit 32 Pictograms | 134 | 43 |
| | 2. Represent information on a pictogram | | | |
| | 3. Identify the most common features of pictogram (the mode) | | | |
| | 4. Mention the usefulness of pictogram (the mode) | | | |

# Unit 1 Counting and writing up to 999

**Objectives**

By the end of this unit, pupils will be able to:

- Correctly count numbers up to 999.
- Count in multiples of two, five, ten and a hundred.

## Suggested resources

- Large 0 to 9 digit cards
- Overlay cards
- Counters, such as matchsticks, bottle tops, seeds, pebbles or buttons
- Pupil's Book
- Workbook

## Key word definitions

*digit*: a written symbol for the numbers 0 to 9
*ones*: the first digit from the right, which tells you how many ones there are in a number
*tens:* the second digit from the right, which tells you how many tens there are in a number
*hundreds*: the third digit from the right, which tells you how many hundreds there are in a number
*step size*: the difference between one number and the next in a sequence

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to count to at least 100. Pupils should be able to write all numerals without reversals.

## Common errors pupils make

When writing numbers in figures, numbers with a zero in one of the place values can sometimes be ignored, so a three-digit number becomes two digits. Work on place value in Unit 2 should provide further understanding to correct this error. If this occurs, correct it and make a note of the pupils' names as they may need extra attention when working through Unit 2.

## Evaluation guide

Assess whether pupils can:

- Identify and read out given numbers up to 999.
- Count objects in hundreds, tens and units.

## Lesson 1 *Pupil's Book page 8; Workbook page 5*

### Preparation

You will need to have:

- Large 0 to 9 digit cards
- Overlay cards
- Pupil's Book
- Workbook

### Starter activity

Place large zero to nine digit cards in two circles on the floor, not in sequence. The cards in one circle will be the tens digit, and those in the other will be the ones or units digit. Divide the class into two teams. The first person from one team walks around the edge of the 'tens' circle, while the first person from the other team walks around the edge of the 'ones' circle. When the teacher calls stop, the pupils place their toes on the card they are next to, and looking at both their card and the other person's card, call out the two-digit number. The first person to call the correct number stays in, while the other goes to the back of their team, and the next person in line joins the circle.

### Lesson focus

Revise with the pupils the numbers from the game used in the starter activity. For example, take 45 and rewrite it as 40 and 5. Use the overlay cards to show the five sliding over the top of the zero in the forty. Ask the pupils how many tens in forty-five. Revise 45 = four tens and five ones. Repeat with other two-digit numbers if necessary. Give pupils a three-digit number, for example 345. Ask them to expand the number with you.

Ask: How many hundreds? Record on the board 300. How many tens? Record 40. How many ones? Record 5.

Use the overlay cards and slide the 40 over the zeros on the 300 card and the five over the zero on the 40 card.

Practise making numbers with the overlay cards. Include numbers with zero tens or zero ones, for example 307, 208, 560 and 280.

Complete Exercise 1 (Pupil's Book page 8). Pupils should have overlay cards to use if they wish.

### Answers

**Exercise 1**

323, 327, 329, 343, 347, 349, 363, 367, 369
523, 527, 529, 543, 547, 549, 563, 567, 569
823, 827, 829, 843, 847, 849, 863, 867, 869

**Worksheet 1**

1. **a)** 325
   **b)** 245
   **c)** 691
   **d)** 118
   **e)** 876
   **f)** 901

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to make a three-digit number from its component parts.

**Homework activity**

Worksheet 1, question 1 (Workbook page 5). Answers above

**Support activity**

If pupils need extra support, allow them to use the overlay cards to make a given list of three-digit numbers, such as 125, 348, 209, 415, etc. Then ask them to write down a list of their own three-digit numbers and use the overlay cards to make these numbers. Check their work and guide them where necessary.

## Lesson 2 *Pupil's Book page 9*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Have pupils pair up and practise counting in ones from a given number in the range 0 to 1 000. Pupils should be able to count easily from 0 to 100, so challenge them in unfamiliar ranges. For example, start counting at 475 and stop at 532. Giving the pupils a stopping number means that they have to concentrate on the numbers as they are counting.

### Lesson focus

Once pupils have completed the starter activity in pairs, work as a class and practise counting forwards in ones from a three-digit number. Write the start number and the stop number on the board before you start counting.

Now move on to counting backwards in ones from a three-digit number, writing both the start and stop numbers on the board. Work through the example on page 9 of the Pupil's Book to consolidate counting forwards and backwards.

Complete Exercise 2 and the puzzle exercise (Pupil's Book page 9).

### Answers

**Exercise 2**

**1.** 344; 347; 350
**2.** 494; 497; 500
**3.** 213; 211; 210
**4.** 704; 701; 699
**5.** Teacher to check.

**Puzzle**

1 000

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book.

Pupils should be able to count forwards and backwards in ones from a given three-digit number.

**Extension activity**

Challenge the pupils to time themselves counting to 1 000 in ones. Just for fun, can they count backwards from 1 000 back to one?

**Support activity**

If pupils struggle with counting, particularly counting backwards, allow them to use objects to help them. For example, give them a pile of buttons, beads, beans, etc. and ask them to count the number of objects in the pile. Then tell them to start with a particular number, for example 283, and use the objects to count from that number onwards. For counting backwards, ask them to remove an object from the pile for each number that they count.

## Lesson 3 *Pupil's Book page 10*

### Preparation

You will need to have:

- Counters
- Pupil's Book

### Starter activity

Have pupils sit on their desks and ask them to skip count in twos. They have the choice of saying one or two numbers. For example, the first person could say 2, or they could say 2, 4. If they say 2, the next person can say 4 or 4, 6, and so on. The person who lands on 10 has to sit on their chair. When there are a few pupils left in the game, you can see the pupils become more strategic. The winner is the last pupil sitting on their desk.

### Lesson focus

Discuss the idea of different counting sequences. Remind pupils that they have counted in twos, fives and tens previously in the range 0 to 100. Practise using these sequences within the range 0 to 1 000, both forwards and backwards, starting on a multiple of two if counting in twos; a multiple of five if counting in fives, and a multiple of ten if counting in tens.

Introduce the idea of bigger counting steps. Ask what would be easy big steps to count in. Pupils should be able to suggest hundreds and fifties. Record the counting numbers 125, 225, 325 on the board. Ask pupils to continue to count in hundreds up to 1 025.

Now explain that the step size is the difference between two numbers in a sequence. Write a sequence of numbers on the board, for example 25, 20, 15, 10, 5 and ask pupils to identify the step size. Because the difference between successive numbers is 5, the step size is 5. Also work through the example on page 11.

Complete Exercises 3 and 4 (Pupil's Book page 11). The challenge exercise (Pupil's Book page 11) provides an extra example.

### Answers

**Exercise 3**

**1.** 70, 75, 80, 85, 90, 95, 100, 105, 110, 115
**2.** 150, 250, 350, 450, 550, 650, 750, 850, 950, 1 050
**3.** 100, 200, 300, 400, 500, 600, 700, 800, 900, 1 000
**4.** 990, 988, 986, 984, 982, 980, 978, 976, 974, 972
**5.** 781, 681, 581, 481, 381, 281, 181, 81
**6.** 421, 431, 441, 451, 461, 471, 481, 491, 501, 511

**Exercise 4**

**1.** 5
**2.** 10
**3.** 50
**4.** 2
**5.** 100
**6.** 100

**Challenge**

**1.** 120, 125, 130, 135, 140
**2.** 908, 918, 928, 938; 948
**3.** 900, 950, 1 000, 1 050, 1 100
**4.** 774, 772, 770, 768, 766
**5.** 722, 822, 922, 1 022, 1 122
**6.** 443, 343, 243, 143, 43

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to count using skip counting sequences forwards and backwards in twos, fives, tens and hundreds.

**Extension activity**

Record the counting numbers 25, 50, 75, 100, 125 until 200 on the board. Ask pupils to continue to count in 25s up to 1 000.

**Support activity**

Give pupils extra practice counting aloud in intervals, working with a partner.

## Revision lesson for Unit 1

*Pupil's Book pages 8–11; Workbook pages 5–6*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 1:
- Correctly counting numbers up to 999.
- Counting in multiples of two, five, ten and a hundred.

Make sure that pupils are familiar with the key word definitions for this unit:
- *digit* : a written symbol for the numbers 0 to 9
- *ones*: the first digit from the right which tells you how many ones there are in a number
- *tens*: the second digit from the right which tells you how many tens there are in a number
- *hundreds*: the third digit from the right which tells you how many hundreds there are in a number
- *step size*: the difference between one number and the next in a sequence

Complete Worksheet 1 (Workbook page 6), questions 2, 3 and 4.

### Answers

**Worksheet 1**

**2.** **a)** 901; 902; 903; 904; 906; 907; 908; 909; 910
**b)** 200; 300; 400; 500; 700; 800; 900; 1 000
**c)** 70; 75; 85; 90; 95; 100; 105

**3.** five hundred; six hundred; seven hundred; eight hundred; nine hundred

**4.** **a)** 102
**b)** 250
**c)** 478
**d)** 998

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to correctly count numbers up to 999 and count in multiples of two, five, ten and a hundred.

# Unit 2 Place value

**Objectives**

By the end of this unit, pupils will be able to:

- State the place value of a digit in a three-digit number.

## Suggested resources

You will need to have:

- 0 to 9 digit cards
- Arrow cards
- Bead abacus
- Pupil's Book
- Workbook

## Key word definitions

*place value:* the value of where the digit is in a number, such as ones, tens, hundreds, is called a place value

*abacus:* an abacus is a counting frame that has beads that slide on rods

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be very confident with two-digit numbers, and the same depth of place value understanding needs to be extended to three-digit numbers. What was firm with two digits can become shaky with the introduction of a third digit; this is why it is important to repeat work done with two digits when a third digit gets added.

## Common errors pupils make

The zero as a place holder causes the most errors when pupils write a three-digit number in figures. Pupils should be given plenty of opportunities to practise the use of zero as a place holder.

## Evaluation guide

Assess whether pupils can:

- State the place value of a digit in a given whole number.

## Lesson 1 *Pupil's Book page 12*

### Preparation

You will need to have:

- 0 to 9 digit cards
- Arrow cards
- Pupil's Book

### Starter activity

Play *Guess My Number Skeleton*. Draw three horizontal lines on the board on which to write the three digits of the number. Tell the pupils that you are thinking of a three-digit number and they must guess the hundreds digit by asking, for example, 'Is it 300?' (not three). If it is, write the three in the hundreds column. If it is not, then draw a bone on a skeleton. (It can be a stick man drawing – you can decide the amount of detail before completion.) When the hundreds digit has been identified, they must then guess the tens digit by asking, for example, 'Is it 40?' (not four). Once the tens digit has been identified then they can guess the ones digit. If you complete the skeleton before the pupils have guessed the complete number, you win and they lose.

### Lesson focus

Placing the digits next to each other and reading them as a three-digit number does not necessarily mean pupils understand that the number is made up of component parts added together. So pupils need to be guided to expand the numbers and rewrite them as an addition equation.

Give the pupils a three-digit number and ask them to make it with their arrow cards, for example, the number 526. How many arrow cards have you used to make this number and which cards are they? Write on the board: 500 + 20 + 6 = 526.

Emphasise that the 5 in 526 has a place value of 5 hundreds, or 500; the 2 has a place value of 2 tens, or 20; and the 6 has a place value of 6 ones, or 6.

Ask pupils to describe the place value of the digits in the number 374. Give the pupils some more to practise with other numbers and then complete Exercises 1 and 2 (Pupil's Book page 12).

### Answers

**Exercise 1**

**1.** 6; 4; 2
**2.** 2; 1; 9
**3.** 9; 5; 4
**4.** 1; 8; 9
**5.** 9; 9; 9

**Exercise 2**

**1.** 20
**2.** 9
**3.** 200
**4.** 600
**5.** 40
**6.** 0
**7.** 0
**8.** 3
**9.** 200
**10.** 80

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to expand a three-digit number into its component parts. Pupils should be able to state the value of a digit by its position in a number.

**Extension activity**

Ask the pupils to write some 'guess my number' questions following the pattern:

I have three digits. I have seven hundreds. I have four tens. I have five ones. Write me as an addition equation and write the answer.

700 + 40 + 5 = 745

**Support activity**
Placing digits next to each other and reading them as a three-digit number does not necessarily mean pupils understand that the number is made up of component parts added together. Work individually with pupils who do not demonstrate this understanding, using overlay cards to illustrate once again what each digit represents.

## Lesson 2 *Pupil's Book page 13*

### Preparation

You will need to have:
- Bead abacus, or a drawing of an abacus on the board
- 0 to 9 digit cards
- Pupil's Book

### Starter activity

Choose three pupils to hold digit cards at the front of the class. Each of the three pupils needs a set of zero to nine cards in order from zero to nine. All three pupils start with their pack of cards on zero with the cards facing the class. The first pupil, on the right, is in the ones column, the second pupil the tens and the third pupil the hundreds.

The remainder of the class count slowly and as they count the pupils holding the cards must move a card from the front to the back of the pack so the digits shown to the class match the number counted. The pupil holding the ones pile will be continuously turning cards. The tens pupil will change a card every ten and the hundreds pupil every hundred.

### Lesson focus

Introduce the abacus. Either a real bead abacus if you have one, or a simple drawing on the board: a base line with three perpendicular lines representing ones column, tens column and hundreds column. **H T U**

Remind pupils that the largest digit you can have in each column is a 9. (Refer back to the starter activity.) Draw nine beads on the ones column, or place nine beads on the abacus. What happens when we have one more? We have one in the tens column and zero in the ones column. Show by removing the nine beads or rubbing them out and placing or drawing one bead in the tens column.

Make the following numbers on the bead abacus or draw them on the board, and ask the pupils to tell you the number represented: 27, 9, 162, 350, 808.

Make sure that pupils understand that an empty column in the abacus represents a zero digit.

Make or draw the number 99. Ask what happens if you add one more bead. Pupils should be able to tell you to start a new column and remove all the other beads, and that it is written as 100, because the number after 99 is 100.

Complete Exercises 3 and 4 (Pupil's Book page 13).

## Answers

**Exercise 3**

Teacher to check pupils' diagrams.

**Exercise 4**

**1.** 253
**2.** 172
**3.** 914
**4.** 71
**5.** 609
**6.** 540

**Puzzle**

845

**Challenge**

Teacher to check pupils' diagrams.

**Assessment**

Observe and listen to pupils during the lesson, and review their answers to the exercises. Pupils should be able to use a bead abacus to represent three-digit numbers.

Pupils should be able to read an abacus picture and draw an abacus picture for a three-digit number.

**Extension activity**

Ask pupils to complete the challenge exercise on page 13 of the Pupil's Book.

Give the pupils the following numbers to draw on abacus pictures: 428, 395, 266, 504, 670.

**Support activity**

Give pupils who need extra practice the opportunity to work with an abacus and form their own three-digit numbers. Ask them to explain to you what each row of beads represents, reminding them of what they learnt about place value in the previous lesson using the overlay cards. If necessary allow them to use overlay cards alongside the abacus to illustrate the same three-digit number.

**Homework activity**

Puzzle activity (Pupil's Book page 12). Answer above.

## Revision lesson for Unit 2

*Pupil's Book pages 12–13; Workbook page 7–8*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 2:

- Stating the place value of a digit in a three-digit number.

Make sure that pupils are familiar with the key word definitions for this unit:

- *place value*: the value of where the digit is in a number, such as ones, tens, hundreds, is called a place value
- *abacus*: an abacus is a counting frame that has beads that slide on rods

Complete Worksheet 2 (Workbook pages 7–8).

### Answers

**Worksheet 2**

**1.** **a)** 7 hundreds, 1 ten and 9 units
**b)** 2 hundreds, 4 tens and 6 units
**c)** 1 hundred, 5 tens and 8 units
**d)** 8 hundreds, 0 tens and 4 units

**2.** **a)** 50
**b)** 0
**c)** 100
**d)** 600
**e)** 6
**f)** 10

**3.** **a)** 218
**b)** 943
**c)** 218

**4.** **a)** 3 beads; 1 bead; 8 beads
**b)** 5 beads; 5 beads; 6 beads
**c)** 1 bead; 0 beads; 3 beads

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to state the place value of a digit in a three-digit number.

# Unit 3 Ordering and comparing whole numbers

**Objectives**

By the end of this unit, pupils will be able to:

- Order whole numbers and use the symbols < and >.
- Mention the need for ordering and counting.

## Suggested resources

You will need to have:

- Counters and buttons
- Pack of cards
- 0 to 9 digit cards
- 0 to 100 number cards

## Key word definitions

*order:* placing numbers in the correct sequence following a rule (such as from smallest to largest)
*largest:* the largest number in a group of numbers
*smallest:* the smallest number in a group of numbers
*greater than:* if one number is larger than another, we say it is greater than that number
*less than:* if one number is smaller than another, we say it is less than that number
*compare:* stating whether one number is greater or less than another number

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils should be confident reading and counting with three-digit numbers.

## Evaluation guide

Assess whether pupils can:

- Order pairs of three-digit numbers using the < and > symbols.

## Lesson 1 *Pupil's Book page 14; Workbook page 9*

### Preparation

You will need to have:

- Digit cards
- 0 to 100 number cards
- Pupil's Book

### Starter activity

Play *Ladders.* Ask the pupils to draw a ladder in their books with six rungs, creating five spaces between the rungs. Call out a two-digit number from the pile of 0 to 100 number cards. As each number is called, the pupils must write the number in one of the spaces on their ladder. They are trying to write the numbers in order from smallest at the bottom to largest at the top, and have to decide where they think each number should go to give them the best chance of having a space to write the next number that is called.

Once a number is written, it cannot be changed. If a called number cannot be placed, the pupil has to wait for the next number to fit their ladder. Pupils who manage to fill in five numbers in sequence correctly are winners.

This game requires the pupils to apply knowledge of number sequences and probability.

### Lesson focus

The Ladders game can be used as a teaching tool for sequencing three-digit numbers.

Play *Ladders* using numbers with different hundreds digits. Write three numbers on the board: 245, 345, 445. Ask the pupils which is the largest number and which digit tells them this. They should be focusing on the hundreds digit.

Play *Ladders* using numbers where the hundreds are always the same. Write three new numbers on the board: 435, 445, 465. Ask: If the hundreds numbers are the same, how do you know which number is the largest or smallest? They should now be focusing on the tens number.

Play *Ladders* with numbers where the hundreds and tens numbers are the same. Write these numbers on the board: 435, 436, 437. Ask: If the hundreds and the tens numbers are the same, how do you know which number is the largest or smallest? They should now focus on the ones number.

Complete Exercise 1 (Pupils' Book page 14).

### Answers

**Exercise 1**

**1.** 211, 215, 345, 455, 532
**2.** 299, 548, 576, 676, 684
**3.** 354, 357, 376, 843, 976
**4.** 168, 244, 295, 439, 648
**5.** 10, 76, 84, 311, 760

**Worksheet 3**

**1.** **b)** 49, 59, 61, 66
**c)** 79, 93, 98, 99
**d)** 2, 169, 192, 345
**e)** 799, 898, 913, 979
**f)** 198, 303, 393, 427

**Assessment**

Observe and listen to the pupils during the lesson, especially during the Ladders games. Look at their answers to the exercises in the Pupil's Book. Pupils should be able order three-digit numbers.

**Homework activity**

Worksheet 3 question 1 (Workbook page 9). Answers above.

**Support activity**

If pupils are struggling to order three-digit numbers, give them a set of overlay cards, and suggest that they first make each number using the overlay cards, then take them apart and compare the digits one by one, starting with the hundreds digit.

## Lesson 2 *Pupil's Book page 15; Workbook page 10*

### Preparation

You will need to have:

- Counters or buttons
- Pupil's Book

### Starter activity

Give each pupil an odd number of counters or buttons. Ask them to pair up and each make two piles of counters or buttons. Pupils should look at each other's piles and state which pile has the greater number of counters or buttons and which pile has the smaller number. This activity consolidates work done in the previous lesson on ordering numbers, and prepares pupils to compare two numbers and decide which is the greater and which is the smaller.

### Lesson focus

Write two numbers on the board: 45 and 67. Ask the pupils which is the larger number and which is the smaller number. The larger number is 67, so we say 67 is greater than 45. The smaller number is 45, so we say 45 is less than 67. Write on the board: 67 is greater than 45 and 45 is less than 67.

Instead of the words 'is greater than' we can write 67 > 45. Instead of the words 'is less than' we can write 45 < 67.

Show the pupils that the larger (greater) end of the sign always points towards the larger number, and the smaller end of the sign always points to the smaller number.

Remind pupils that when we compare two-digit numbers, we compare the tens first, and if the tens are the same we compare the ones, for example when comparing 25 and 29.

Write some pairs of numbers on the board and invite pupils to come and complete them on the board with assistance from the class as necessary.

For example:
27 and 45;
36 and 54;
65 and 63;
42 and 48.

Remind pupils how they used the different columns to help them order numbers. They use exactly the same principles when comparing two numbers.

Complete Exercises 2 and 3 (Pupil's Book page 16).

### Answers

**Exercise 2**

**1.** 2 < 4
**2.** 4 > 2
**3.** 9 > 1
**4.** 7 > 6
**5.** 3 < 5
**6.** 5 < 9

**Exercise 3**

**1.** 83 > 41
**2.** 62 < 91
**3.** 36 < 77
**4.** 51 > 38
**5.** 23 < 35
**6.** 15 < 19

**Worksheet 3**

**4.** **c)** 99 < 165
**d)** 50 > 39
**e)** 45 < 59
**f)** 341 > 267
**g)** 438 > 358
**h)** 699 < 951
**i)** 250 > 198
**j)** 891 < 901

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able compare two-digit numbers and use symbols for greater than and less than.

**Homework activity**
Worksheet 3 question 4 (Workbook page 10).
Answers above.

**Support activity**
Allow pupils who need extra support with comparing one- and two-digit numbers to use small items such as beads, buttons, bottle tops, etc. to help them. Give them two piles of items and ask them to tell you which pile has the greater number of items, and then to write down their answer using the < or > symbols.

## Lesson 3 *Pupil's Book page 16*

### Preparation

You will need to have:
- Digit cards
- Pack of cards
- Pupil's Book

### Starter activity

In pairs, pupils should practise comparing three-digit numbers by playing the game described in the challenge exercise (Pupil's Book page 16).

### Lesson focus

Remind pupils of the strategy we used to compare two-digit numbers and of the symbols < and >, using the example 37 and 34. Instead of the words 'is greater than' we can write 37 > 34. Instead of the words 'is less than' we can write 34 < 37.

Remind pupils that when we compare two-digit numbers, we compare the tens first, and if the tens are the same we compare the ones.

Explain that when we compare three-digit numbers, we compare the hundreds first, and if the hundreds and the same we compare the tens. If the hundreds and tens are both the same, we compare the ones, for example when comparing 799 and 797.

Write some pairs of three-digit numbers on the board and invite pupils to come and complete them on the board with assistance from the class as necessary. For example:
523 and 325;
367 and 546;
465 and 473;
746 and 742.

Remind pupils how they used the different columns to help them order numbers. They use exactly the same principles when comparing two numbers.

Complete Exercise 4 and the puzzle exercise (Pupil's Book page 17).

## Answers

**Exercise 4**

**1.** 231 < 452
**2.** 546 < 854
**3.** 345 > 243
**4.** 426 < 765
**5.** 859 > 825
**6.** 636 > 632

**Puzzle**

Pupils will have different answers. Teacher to check the correct use of the < and > signs.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able compare three-digit numbers and use symbols for greater than and less than.

**Extension activity**

Pupils can play the challenge game again (Pupil's Book page 16), but this time they write down their number first, then the correct greater than or less than sign, and finally their partner's number.

## Revision lesson for Unit 3

*Pupil's Book pages 14–17; Workbook pages 9–10*

## Preparation

You will need to have:

- Workbook
- Pupil's Book

## Lesson focus

Revise the work covered in Unit 3:

- Order whole numbers and use the symbols < and >.
- Mention the need for ordering and counting.

Make sure that pupils are familiar with the key word definitions for this unit:

- *order*: placing numbers in the correct sequence following a rule (such as from smallest to largest)
- *largest*: the largest number in a group of numbers
- *smallest*: the smallest number in a group of numbers
- *greater than*: if one number is larger than another, we say it is greater than that number
- *less than*: if one number is smaller than another, we say it is less than that number
- *compare*: stating whether one number is greater or less than another number

Complete Worksheet 3 (Workbook pages 9–10) questions 2, 3 and 5.

## Answers

**Worksheet 3**

**2.** **b)** 76; 71; 70; 68; 67; 64; 59; 53
**c)** 112; 104; 89; 78; 72; 71; 47; 45
**d)** 976; 953; 912; 899; 862; 843; 764; 709
**e)** 276; 254; 245; 198; 189; 167; 164; 122
**f)** 467; 461; 419; 374; 349; 328; 302; 301

**3.** **a)** Monday
**b)** Tuesday
**c)** 280 letters
**d)** 83; 67; 47; 35; 29; 19

**5.** 10
4; 16
6; 24; 30
16; 24; 40
20; 25; 35
12; 36; 60
28; 56; 70
16; 48; 80
36; 54; 72

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to order whole numbers and use the symbols < and >.

# Unit 4 Fractions of shapes

**Objectives**

By the end of this unit, pupils will be able to:

- State fraction of a group of concrete objects.
- Divide shapes into fractions ($\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; etc.)

## Suggested resources

You will need to have:

- Paper shapes: squares, rectangles, triangles, circles
- Small items such as counters or buttons
- Papers of equal sizes
- Scissors
- Markers

## Key word definitions

*fraction:* a fraction is a part of a whole
*half:* a half means one part out of two parts
*quarter:* a quarter means one part out of four parts
*third:* a third is one part out of three parts
*fifth:* a fifth is one part out of five parts
*sixth:* a sixth is one part out of six parts
*numerator:* the number above the fraction line
*denominator:* the number below the fraction line

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be able to recognise and name the fractions $\frac{1}{2}$ and $\frac{1}{4}$.

## Common errors pupils make

Fractions are a difficult concept and pupils require plenty of practical experience to grasp the concepts, as they do not follow the same rules as whole numbers. Pupils must believe in the existence of numbers between numbers.

They need to eventually make a mind shift to understand fractions as it requires dealing with two things at the same time in relation to each other, viz. the number of equal parts (which is the focus of this unit), and how many of the equal parts (the focus of the later unit on fractions).

## Evaluation guide

Assess whether pupils can:

- Divide a given set of objects into $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{5}$; $\frac{1}{6}$.
- Divide a given shape into fractions: $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{5}$; $\frac{1}{6}$.

## Lesson 1 *Pupil's Book page 18*

### Preparation

You will need to have:

- Small items such as counters or buttons
- Pupil's Book

### Starter activity

In pairs, pupils should divide a group of 24 counters or buttons into halves. They should keep dividing each smaller group into halves again, until they are left with one counter or button in each half.

### Lesson focus

Use the starter activity to remind pupils that dividing a group of objects or shapes into halves means dividing it into two equal parts. Explain that dividing a group of objects or shapes into quarters means dividing it into four equal parts, and dividing a group of objects or shapes into thirds means dividing it into three equal parts. Reinforce the definition of a fraction as part of a whole, where the numerator shows us the number of parts, and the denominator shows us the total number of parts.

Ask pupils to use their counters or buttons from the starter activity and divide them into quarters – four equal parts that should each contain six counters or buttons. Now ask them to divide their counters or buttons into thirds – three equal parts each containing eight counters or buttons. Lastly, ask them to divide their counters into sixths – six equal parts each containing four counters.

Work through the example on page 18 of the Pupil's Book and then complete Exercise 1 (Pupil's Book page 19).

### Answers

**Exercise 1**

**1.** 3 leaves coloured in
**2.** 3 half-moons coloured in
**3.** 5 pencils coloured in
**4.** 5 apples coloured in
**5.** 2 flowers coloured in
**6.** 4 triangles coloured in

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to divide groups of items into fractions.

**Extension activity**

Ask pupils to divide a group of 30 counters or buttons into halves, thirds and sixths. Then ask them if they can divide them into fifths and tenths, encouraging them to apply the principles used in this lesson to these unfamiliar fractions.

**Support activity**

To further illustrate fractions of groups, ask pupils to imagine that a class with 24 pupils in it was playing a game and there needed to be two equal size groups. How would they form these groups? Repeat, asking the pupils how they would divide the class into three equal size groups, four equal size groups and six equal size groups.

## Lesson 2 *Pupil's Book page 20; Workbook page 12*

### Preparation

You will need to have:

- Small items such as counters or buttons;
- Pupil's Book
- Workbook

### Starter activity

Pupils can complete the puzzle exercise (Pupil's Book page 18) as a starter activity to consolidate the work done in Lesson 1.

### Lesson focus

Start by asking pupils to define a half, a third, a quarter, a fifth and a sixth. Then explain that these are all unit fractions. Unit fractions are fractions that are one part of a whole. Point out that the larger the number below the line, the smaller the unit fraction.

Write the unit fraction $\frac{1}{2}$ on the board and focus on the denominator. Remind pupils that the denominator tells us how many equal parts make up one whole. Look at the written fraction for one third, $\frac{1}{3}$, and ask pupils how many equal pieces a shape would have if it was cut or folded into thirds. Use both the written word and the unit fraction, each time focusing on the denominator.

Ask questions like: How many pieces would you cut a cake into if you needed one-fifth? (five) What fraction would you cut a cake into if you needed to share it equally between six pupils? (sixths)

Look at the language pattern after half, third, quarter, the pattern of fifth, sixth, etc. Refer to the examples on page 20 of the Pupil's Book.

Draw some shapes on the board and ask pupils to attempt to divide them into equal sections. Some will be easier than others, and they should be encouraged to see which ones are easier to work with for different fractions.

Complete Exercise 2 (Pupil's Book page 21).

### Answers

**Exercise 2**

Pupils should have copied:

1. square divided into four small blocks
2. circle with one line diameter drawn
3. circle with three diameters drawn
4. rectangle
5. square divided into three rectangles

**Worksheet 4**

3. **a)** 7
   **b)** 3
   **c)** 3
   **d)** 3

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to name a unit fraction.

**Homework activity**

Worksheet 4 question 3 (Workbook page 12). Answers above.

**Support activity**

Give pupils practice naming unit fractions by showing them pictures of shapes with a fraction coloured in and asking them which fraction is coloured in.

## Lesson 3 *Pupil's Book page 21; Workbook page 11*

### Preparation

You will need to have:
- Paper for folding and cutting
- Scissors
- Pupil's Book

### Starter activity

On the board, draw a small square. Ask: If this square is half of my shape what could the whole shape look like? Invite someone to come and complete the shape. Draw another small square or return to the original square and ask: If this square is one-third of my shape what could my whole shape look like? Ask pupils to draw a small square in their book and shade it in. If the square is one-quarter of the shape complete the whole shape. Discuss the different possible answers.

### Lesson focus

Work through Exercise 3 (Pupil's Book page 21). Pupils should see that it does not matter if they fold their square horizontally or diagonally, two-quarters are always the same as a half. Make sure they compare with someone who has folded differently from themselves.

To fold a square in thirds is quite tricky but possible. Some pupils may think they should create the Y shape, particularly if they have only been presented with a circle shown in thirds. A square folded in thirds will give three equal rectangles.

Ask the pupils if they can think of a way of turning the paper folded in thirds into six equal pieces. Do they realise you just need to fold the folded in thirds paper in half? Give pupils some time to make the discovery. Do not automatically tell them what to do. Can they make the connection that $2 \times 3 = 6$?

The fold into sixths can be made by folding the paper lengthways or across the shorter side. Again it is important for pupils to see that whichever way the paper is folded, two sixths is the same as one third.

By looking at their folded paper they should be able to see that three-sixths is the same as one-half. Make a connection to their previous knowledge that half of six is three.

Show the pupils how to use their shapes to complete the challenge exercise (Pupil's Book page 20).

### Answers

**Exercise 3**

**1.** 4 quarters
**2.** 2 squares drawn. One square marked $\frac{1}{2}$ and labelled.
**3.** Square marked in quarters and labelled $\frac{1}{4}$.
**4.** Two quarters are the same as one half.
**5.** Folded paper in thirds, folded in half to create sixths.
**6.** Square marked in thirds labelled $\frac{1}{3}$.
**7.** Square marked in sixths labelled $\frac{1}{6}$.

**Challenge**

two quarters
three sixths
two sixths

**Worksheet 4**

**1.** Teacher to check shading.
**b)** $\frac{1}{4}$
**c)** $\frac{1}{3}$
**d)** $\frac{1}{6}$
**e)** $\frac{1}{5}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to find an equivalent fraction of a shape by direct matching.

**Homework activity**

Workbook page 11: Worksheet 4, question 1. Answers above.

## Revision lesson for Unit 4

*Pupil's Book pages 18–21; Workbook pages 11–12*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 4:
- Stating fractions of a group of concrete objects.
- Dividing shapes into fractions ($\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; etc.).

Make sure that pupils are familiar with the key word definitions for this unit:
- *fraction*: a fraction is a part of a whole
- *half*: a half is one part out of two parts
- *quarter*: a quarter means one part out of four parts
- *third*: a third is one part out of three parts
- *fifth:* a fifth is one part out of five parts
- *sixth*: a sixth is one part out of six parts
- *numerator:* the number above the fraction line
- *denominator*: the number below the fraction line

Complete Worksheet 4 question 2 (Workbook page 12).

### Answers

**Worksheet 4**

**2.** **a)** 4 buttons circled
**b)** 4 buttons circled
**c)** 2 buttons circled
**d)** 2 buttons circled
**e)** 2 buttons circled
**f)** 6 buttons circled

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to state fractions of a group of objects and divide shapes into fractions.

# Unit 5 Equivalent fractions

**Objectives**

By the end of this unit, pupils will be able to:

- Write fractions which have the same value as a given fraction.
- Use the symbols < or > to order fractions.

## Suggested resources

You will need to have:

- Small items such as counters or buttons
- Paper cut-outs of circles
- Crayons
- Strips of paper of equal length
- Unit fraction symbols
- Large fraction wall to display
- Thin rope
- Clothes pegs

## Key word definitions

*equivalent:* fractions with the same values are called equivalent fractions

*diagram:* a picture used to illustrate and solve a problem

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should understand the definition of a unit fraction and know what the numerator and denominator represent.

## Common errors pupils make

Some pupils assume that the larger the denominator of a unit fraction, the larger the fraction. They find it difficult to reconcile the fact that a larger denominator makes a smaller fraction; this seems to go against what they know about numbers. Look out for this error and reassure them that because the denominator tells you how many pieces the whole has been divided into, the more pieces, the smaller the pieces must be.

## Evaluation guide

Assess whether pupils can:

- Divide a given set of objects into a given number of parts to form required equivalent fractions.
- Order given set of fractions using the symbols < or >.

## Lesson 1 *Pupil's Book page 22; Workbook page 13*

### Preparation

You will need to have:

- Small items such as counters or buttons
- Paper cut-outs of circles
- Crayons for shading
- Pupil's Book

### Starter activity

Place pupils in pairs and give each pair four paper cut-outs of a circle. Ask them to shade a half of their first circle, two-quarters of their second circle, three-sixths of their third circle and four-eighths of their fourth circle. They should then compare the four circles and notice that a half is equivalent to two-quarters, three-sixths and four-eighths.

### Lesson focus

Use the starter activity to introduce pupils to the concept of equivalent fractions as fractions with the same value. Even though they shaded in a different fraction in each of their circles, the same amount of the shape is shaded in each circle. This is because those fractions are equivalent. Write on the board:

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$

Work through the example on page 22 of the Pupil's Book to reiterate that $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions. Now write on the board:

$\frac{1}{3} = \frac{\square}{6} = \frac{\square}{9} = \frac{\square}{12}$

Leave the numerators blank and ask pupils to state the numerator for each equivalent fraction, explaining how they worked it out. Some pupils may need a diagrammatic illustration of this example. You could also give them piles of counters or buttons and ask them to split the pile into thirds and sixths to illustrate that there are the same number of counters in the pile containing one third as in two piles containing one sixth each, thus $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$.

Complete Exercises 1 and 2 (Pupil's Book page 23).

### Answers

**Exercise 1**

**1.** 8
**2.** 4
**3.** 8
**4.** $\frac{1}{3}$ and $\frac{2}{6}$

**Exercise 2**

**1.** $\frac{1}{2} = \frac{2}{4}$
**2.** $\frac{1}{3} = \frac{2}{6}$
**3.** $\frac{1}{2} = \frac{3}{6}$
**4.** $\frac{2}{4} = \frac{3}{6}$
**5.** $\frac{1}{3} = \frac{2}{6}$

**Worksheet 5**

**1.** **b)** 6
**c)** 12
**d)** 7
**e)** 14
**f)** 5

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to complete missing numerators in a pair of equivalent fractions.

**Homework activity**

Worksheet 5, question 1 (Workbook page 13). Answers above.

**Support activity**

Allow pupils to colour in shapes to reinforce the concept of equivalent fractions. Use the diagrams along the left of page 22 of the Pupil's Book and give pupils similar diagrams to colour in. They should realise that they are colouring in the same portion of the shape each time, even though a different fraction is represented – these are equivalent fractions.

## Lesson 2 *Pupil's Book page 23; Workbook page 13*

### Preparation

You will need to have:

- Small items such as counters or buttons
- Pupil's Book

### Starter activity

Give pupils (working in small groups) a set of 24 counters and ask them to divide the counters in half and record the number of counters in each half. Then ask them to make a pile containing two quarters of the counters and record the number of counters in the pile – they should notice that there are the same number of counters in a half as in two-quarters. Now ask them how many other fractions they can find which contain the same number of counters ($\frac{3}{6}$; $\frac{4}{8}$; $\frac{6}{12}$).

### Lesson focus

Use this lesson to reinforce the concept of equivalent fractions, building on the work done in Lesson 1. The starter activity gives pupils a concrete illustration of the concept. Move them towards the abstract by asking them to write down as many fractions equivalent to one-third as they can. Now ask them to write down as many fractions equivalent to one-quarter as they can. If they struggle to do this, they should use the counters or buttons to help them visualise the problem.

Complete Exercise 3 and the puzzle exercise (Pupil's Book page 23).

### Answers

**Exercise 3**

**1.** 10
**2.** $\frac{2}{4}$ or $\frac{5}{10}$ or $\frac{10}{20}$
**3.** 4
**4.** $\frac{2}{8}$ or $\frac{4}{16}$
**5.** 6
**6.** $\frac{2}{6}$ or $\frac{6}{18}$

**Puzzle**

No, $\frac{2}{3}$ is equivalent to $\frac{4}{6}$.

**Worksheet 5**

**4. b)** $\frac{2}{6}$
**c)** $\frac{3}{6}$
**d)** $\frac{1}{3}$
**e)** $\frac{1}{2}$
**f)** $\frac{3}{6}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to write fractions which have the same value as given fractions.

**Homework activity**

Worksheet 5 question 4 (Workbook page 13). Answers above.

**Support activity**

Give pupils three piles of twelve counters each. Ask them to divide the first pile into halves, the second pile into quarters, and the third pile into sixths. Now ask them to form new piles, the first pile containing one-half, the second pile containing two-quarters, the third pile containing three-sixths. They should count the number of counters in each of their new piles and see that one-half is equivalent to two-quarters and three-sixths.

## Lesson 3 *Pupil's Book page 24; Workbook page 14*

### Preparation

You will need to have:
- Large fraction wall to display on board
- Pupil's Book

### Starter activity

Play *Equivalent Fractions Bingo*. Write a set of fractions on the board and ask pupils to choose six of these fractions and write them in their exercise books. You then call out different fractions one by one and if a pupil has an equivalent fraction on their list they can cross it out. The first pupil to cross out all six fractions on their list shouts, 'Bingo!'. Check that they have crossed out the correct equivalent fractions.

### Lesson focus

Display a fraction wall such as the one on Pupil's Book page 24 on the board without filling in the fractions and ask pupils these questions:
- If the top bar is 1, how can we describe the length of the other bars?
- If the top bar is 2, how long are the others?
- Can you use the picture to explain how we know that $\frac{2}{3} = \frac{2}{3} = \frac{4}{6}$?
- What other fractions can you say are equivalent using the fraction wall?
- Can you state another fraction that is equivalent to $\frac{2}{3}$ if we continued the wall? How do you know?

Make sure that pupils are comfortable working with equivalent fractions, if necessary asking more questions such as the ones above or revising work covered in the previous two lessons.

Complete Exercise 4 (Pupil's Book page 24).

### Answers

**Exercise 4**

**1.** $\frac{2}{4}$ and $\frac{3}{6}$

**2.** $\frac{2}{6}$

**3.** $\frac{4}{6}$

**4.** $\frac{1}{2}$ and $\frac{3}{6}$

**Worksheet 5**

**6.** Check pupils' fraction walls.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to write fractions which have the same value as given fractions.

**Homework activity**

Worksheet 5 question 6 (Workbook page 14).

**Extension activity**

Ask pupils to redraw the fraction wall and extend it to include twelfths. How many twelfths are equivalent to one-half? How many twelfths are equivalent to one-quarter?

## Lesson 4 *Pupil's Book page 24*

### Preparation

You will need to have:

- Strips of paper of equal length
- Unit fraction symbols
- Pupil's Book

### Starter activity

Ask the pupils to visualise a cake cut into quarters and another cake the same size cut in half. Would they rather eat half a cake or quarter of a cake? Why? Answers should include the reason that a half is bigger than a quarter, or a quarter is smaller than a half.

### Lesson focus

Divide the class into small groups. Give each group three strips of paper of equal length. The must fold the first piece in half and label each half: $\frac{1}{2}$. Fold the second piece into quarters and label each piece the $\frac{1}{4}$; third piece must be folded into eighths each piece labelled $\frac{1}{8}$. Lay the strips of paper down, one under the other.

Ask: Which is larger: $\frac{1}{2}$ or $\frac{1}{4}$? Which is larger: $\frac{1}{4}$ or $\frac{1}{8}$? Which is larger: $\frac{1}{2}$ or $\frac{1}{8}$?

Look at the fraction wall on page 24 of the Pupil's Book. Ask which is larger: $\frac{1}{2}$ or $\frac{1}{3}$? Which is smaller: $\frac{1}{3}$ or $\frac{1}{4}$?

Pupils who really struggle may need to have the fractions folded on strips of paper to make direct comparisons. Some pupils find it difficult to reconcile the fact that a larger denominator makes a smaller fraction, as this seems to go against what they know about numbers. Reassure them that this is because the denominator tells you how many pieces the whole has been divided into, and the more pieces, the smaller the pieces must be. Give them an example of dividing a cake up between a number of friends.

Check that pupils can remember the signs for greater than and less than before they complete Exercise 5 (Pupil's Book page 25).

### Answers

**Exercise 5**

1. $\frac{1}{2} > \frac{1}{3}$
2. $\frac{1}{5} < \frac{1}{4}$
3. $\frac{1}{2} > \frac{1}{5}$
4. $\frac{1}{3} > \frac{1}{4}$
5. $\frac{1}{4} < \frac{1}{2}$
6. $\frac{1}{6} < \frac{1}{3}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Do they require the equipment to direct match in order to compare the fractions, or are they able to visualise the fractional part to make the comparison? Pupils should be able to compare and order unit fractions, initially by direct matching.

**Extension activity**

Ask pupils to draw diagrams to prove that their answers are correct for Exercise 5.

**Support activity**

Ask pupils to imagine dividing a class of 24 pupils into halves, quarters, thirds, etc. Ask them whether there will be more pupils in half of the class or in a quarter of the class? Will there be more pupils in a third of the class or in half the class? Will there be more pupils in a quarter of the class or in a third of the class?

## Lesson 5 *Pupil's Book page 25; Workbook page 13*

### Preparation

You will need to have:

- Thin rope
- Clothes pegs
- Strips of paper for folding
- Fraction cards
- Pupil's Book

### Starter activity

Put the pupils into groups of about four and give each group a set of unit fraction symbols: $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{5}$; $\frac{1}{6}$. As a group, ask them to order the unit fractions from the largest fraction to the smallest fraction and record the order in their books when they have come to an agreement as a group. Some groups may place $\frac{1}{6}$ as the largest and $\frac{1}{2}$ as the smallest because they focus on the numbers and 6 is larger than 2. Correct this misconception, when noticed.

### Lesson focus

Tie a piece of string between two chairs and place the label 0 at one chair and the label 1 at the other chair. Ask pupils where they would want to place the number $\frac{1}{2}$ along the piece of string. Most pupils should be able to fix the position of $\frac{1}{2}$. Peg the label $\frac{1}{2}$ on the string.

Next ask them to place the position of $\frac{1}{4}$. Listen to their reasoning about its possible position. Reasoning should include: it is smaller than $\frac{1}{2}$ so therefore it will be closer to 0, or one-quarter is half of a half because two-quarters are the same as one-half.

Next, position $\frac{1}{8}$ on the number line. Reasoning should be that it is closer to 0 because it is smaller than $\frac{1}{4}$. Some pupils may also be able to reason it is half of one quarter. Use a strip of paper folded into half to show halves, then folded in half again to show quarters, then folded in half again to show eighths.

Ask them to look at the symbols they ordered in the starter activity. Do they still agree with the order in which they placed the symbols?

Hopefully they should realise that $\frac{1}{8}$ is the smallest and $\frac{1}{4}$ is the largest.

Now ask them where do they want to place the fraction $\frac{1}{3}$? Reasoning should include it is greater than $\frac{1}{4}$ and less than $\frac{1}{2}$. Where do they want to place $\frac{1}{5}$? Reasoning should include it is greater than $\frac{1}{8}$ but less than $\frac{1}{4}$.

Where do they want to place $\frac{1}{6}$? Reasoning should include it is greater than $\frac{1}{8}$ but less than $\frac{1}{5}$.

Where do they want to place $\frac{1}{7}$? Reasoning should include it is greater than $\frac{1}{8}$ but less than $\frac{1}{6}$

Ask them to look at the symbols they ordered in the starter activity. Do they still agree with the order in which they placed the symbols? Are they now able to self-correct if required?

Complete Exercise 6 (Pupil's Book page 25).

### Answers

**Exercise 6**

Different answers possible, teacher should check each pupil's answers.

**Worksheet 5**

**5. b)** $\frac{1}{3} > \frac{1}{4}$

**c)** $\frac{1}{3} < \frac{1}{2}$

**d)** $\frac{1}{5} > \frac{1}{6}$

**e)** $\frac{1}{6} < \frac{1}{2}$

**f)** $\frac{1}{4} > \frac{1}{5}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils who are still struggling need plenty of folding, cutting and comparing fractions. Make sure you always start with the same size whole. Pupils should be able to order unit fractions and comfortably use the symbols < and > to compare unit fractions.

**Homework activity**
Worksheet 5 question 5 (Workbook page 13). Answers above.

**Support activity**
Draw a fraction number line to help pupils order unit fractions and to illustrate that the bigger the denominator, the closer to zero and thus the smaller the fraction is.

## Revision lesson for Unit 5

*Pupil's Book pages 22–25; Workbook pages 13–14*

## Preparation

You will need to have:
- Workbook
- Pupil's Book

## Lesson focus

Revise the work covered in Unit 5:
- Writing fractions which have the same value as a given fraction.
- Using the symbol < or > to order fractions.

Make sure that pupils are familiar with the key word definitions for this unit:
- *equivalent*: fractions with the same values are called equivalent fractions
- *diagram*: a picture used to illustrate and solve a problem

Complete Worksheet 5 questions 2, 3, 7 and 8 (Workbook pages 13–14).

## Answers

**Worksheet 5**

**2. a)** $\frac{1}{5}$ of 35

**b)** $\frac{1}{3}$ of 33

**3. a)** $\frac{1}{2}$ of 16

**b)** $\frac{1}{6}$ of 12

**7. b)** $\frac{1}{5} + \frac{1}{5} > \frac{1}{4}$

**c)** $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} > \frac{1}{2}$

**d)** $\frac{1}{6} + \frac{1}{6} > \frac{1}{4}$

**e)** $\frac{1}{3} + \frac{1}{3} > \frac{1}{6}$

**f)** $\frac{1}{2} > \frac{1}{5} + \frac{1}{5}$

**8.** Teacher to check – many possible answers.

**Assessment**
Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to write fractions which have the same value as a given fraction and use the symbol < or > to order fractions.

# Unit 6 Addition of two-digit numbers with exchanging or renaming

**Objectives**

By the end of this unit, pupils will be able to:

- Add two-digit numbers with exchanging or renaming.

## Suggested resources

You will need to have:

- Coloured chalks
- Abacus

## Key word definitions

*exchanging:* to put a number into another column when doing addition

*renaming:* writing or saying a number in a different way

*methods:* different ways of solving problems

*expanded form:* splitting a number up into tens and units

*columns:* writing numbers one above the other

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to have recall of number facts to ten.

## Common errors pupils make

- The most common error pupils will make is just a computational mistake, through being nearly at instant recall stage.
- Pupils who cannot use the relationship between 3 + 4 and 13 + 4 need urgent remedial work on the importance of ten, and the way numbers are written, supported with practical equipment to model the numbers.

## Evaluation guide

Assess whether pupils can:

- Add two-digit numbers with exchanging and renaming.

## Lesson 1 *Pupil's Book page 26*

### Preparation

You will need to have:
- Coloured chalks
- Pupil's Book

### Starter activity

Play *Target 80*. The object of the game is to reach as close to 80 as possible. Start with a set of digit cards one to nine. Explain to the pupils that five digit cards are going to be drawn from the set, one at a time. As each is drawn, they must decide whether it is going to be a ones or a tens number. For example, if three is drawn, will they use it as 3 or 30? Each time a card is drawn, the pupils must write down their number (either a ones number or a tens number). After five draws, the pupils total their numbers. Closest to 80 wins the game. Repeated playing of the game allows the pupil to develop the strategies of mentally adding numbers to keep a running total and estimating, gradually learning which digits to use as ones and which as tens.

### Lesson focus

Use the starter activity to remind pupils about place value and how to write numbers in expanded form. In this lesson we will focus on two-digit numbers. Write a few two-digit numbers on the board and ask pupils how many tens and how many units are in each. Use one colour of chalk for the tens and another for the units. Now give pupils a few two-digit numbers and ask them to write them in expanded form, such as
23 (20 + 3);
49 (40 + 9);
17 (10 + 7);
60 (60 + 0).

Now explain to pupils that writing numbers in expanded form is one method we can use to add two-digit numbers. Work through the example on page 26 of the Pupil's Book. Pupils should be able to expand these two-digit numbers confidently. Remind them to collect all the tens numbers together and all the ones numbers together to create a new equation which should be easy to add.

Complete Exercise 1 (Pupil's Book page 27). Before pupils start working through the exercise, write the sums on the board using coloured chalk. As you write, ask pupils to tell you what colour to use for each digit (using different colours for tens and units).

### Answers

**Exercise 1**

**1.** 141
**2.** 101
**3.** 164
**4.** 95
**5.** 91
**6.** 165
**7.** 102
**8.** 107
**9.** 121

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to expand a two-digit number, add the tens and ones and add the resulting numbers.

**Extension activity**

Ask pupils to expand and add these three-digit numbers:
123 + 234;
345 + 456.

**Support activity**

Use overlay cards to illustrate addition with expanding and renaming, and then allow pupils to use them to add these numbers:
24 + 33;
62 + 21;
45 + 39;
74 + 67.

## Lesson 2 *Pupil's Book page 27*

### Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

### Starter activity

Play *21 or Bust*. The pupils start the game standing up. Draw a digit card out of the bag (a dice can be used if available) and call out the number. Record the number on the board. Call out another number and record it next to the first number with an addition sign. Pupils must mentally work out the answer but not call it out. Draw out another digit and again write it on the board. Pupils add the new number to their total. The pupils are trying to get as close to 21 as possible without going over 21. When they think they are close and do not want to risk a number coming out that will take them over 21, they sit down. Any pupils still standing when or if 21 is reached exactly are winners. Once the total has gone over 21, all pupils who are still standing are bust. Start a new game and everyone starts again. You can add a competitive element by pupils starting with five points each, if they are bust they lose a point but if they score exactly 21 they gain two points.

### Lesson focus

The focus of this lesson is using the method learnt in the previous lesson to work out addition word stories. Start by reminding pupils of the expanded form method using the example 54 + 88. Make sure that pupils can collect all the tens numbers together and all the ones numbers together to create a new equation which should be easy for them to add.

Now ask them to write an addition sum from this word story: A bakery sells 46 cakes on Monday and 55 on Tuesday. How many cakes did they sell altogether? Pupils should be able to write the addition sum 46 + 55. Work through this example using expanded form to add the two-digit numbers 46 and 55.

Complete Exercise 2 and the puzzle exercise (Pupil's Book page 27).

### Answers

**Exercise 2**

**1.** 49 oranges
**2.** 65 bottles
**3.** 73 pupils

**Puzzle**

63 years old

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to expand a two-digit number, add the tens and ones and add the resulting numbers. Pupils should be able to apply the same strategy to an equation given in a word story.

**Extension activity**

Ask pupils to make up their own word story for addition of two-digit numbers. They can swap with a friend and work out the answer to each other's word stories using expanded form.

**Support activity**

Read through the word stories with pupils who need support and help them to write an addition equation using the word story.

## Lesson 3 *Pupil's Book page 28*

### Preparation

You will need to have:

- Abacus
- Coloured chalks
- Pupil's Book

### Starter activity

Play *Target 80* as in Lesson 1.

### Lesson focus

In this lesson, we will add 64 and 78 again using a different method – adding in columns. Work through the example on page 28 of the Pupil's Book, using different coloured chalks for the hundreds, tens and units columns. Show pupils how to make sure that the tens and units are in the right columns.

Do a few more examples together as a class for extra practice, including sums that do not need 'carrying' (for example 16 + 72) and sums that do (for example 78 + 23). Reinforce by using coloured chalks.

Complete Exercise 3 (Pupil's Book page 29). Do the first question together using coloured chalks and watch carefully to see which pupils need extra practice. Encourage pupils to use coloured pens or pencils to show the hundreds, tens and units columns clearly.

### Answers

**Exercise 1 (homework)**

**1.** 141
**2.** 101
**3.** 164
**4.** 95
**5.** 91
**6.** 165
**7.** 102
**8.** 107
**9.** 121

**Exercise 3**

**1.** 122
**2.** 85
**3.** 85
**4.** 121
**5.** 106
**6.** 71
**7.** 88
**8.** 62
**9.** 131
**10.** 111

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to add two-digit numbers in columns. Encourage pupils who are struggling to use coloured pens or pencils to help them.

**Homework activity**

Complete Exercise 1 (Pupil's Book page 27) using the column method this time. Answers above.

## Lesson 4 *Pupil's Book page 29*

### Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

### Starter activity

Play *Round the World*. Half of the pupils sit in a circle while one pupil stands behind each one sitting. The teacher calls out an addition where one of the numbers is always nine and the other number another single digit. Both the pupil sitting and the one standing must call out the answer as quickly as possible. If the pupil standing calls correctly first, he or she moves on to stand behind the next pupil in the circle. If the pupil sitting calls correctly first he or she stands up and moves on to the next pupil and the other pupil sits in their place. Keep going around the circle for a full circuit.

### Lesson focus

Use this lesson to consolidate the column method from the previous lesson. Start by working through any questions that pupils struggled with in Exercise 3 (Pupil's Book page 29), using coloured chalks. If necessary, do a few more examples to illustrate the method again.

Complete Exercise 4 (Pupil's Book page 29).

### Answers

**Exercise 4**

Teacher to supervise and check answers.

**Challenge**

456 + 333 = 769
349 + 573 = 922

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to comfortably add two-digit numbers in columns and explain whether they prefer this method or the expanded form method.

**Extension activity**

Ask pupils to complete the challenge exercise on page 29 of the Pupil's Book.

**Support activity**

Use an abacus to illustrate adding in columns and to make it more concrete for pupils who are struggling to carry out the questions in the exercise. Allow them to use an abacus to help them visualise what is happening when they add in columns.

## Revision lesson for Unit 6

*Pupil's Book pages 26–29; Workbook page 15*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 6:
- Adding two-digit numbers with exchanging or renaming.

Make sure that pupils are familiar with the key word definitions for this unit:
- *exchanging:* to put a number into another column when doing addition
- *renaming*: writing or saying a number in a different way
- *methods*: different ways of solving problems
- *expanded form*: splitting a number up into tens and units
- *columns*: writing numbers one above the other

Complete Worksheet 6 (Workbook page 15).

### Answers

**Worksheet 6**

**1.** **b)** 101
**c)** 141
**d)** 120
**e)** 140
**f)** 101

**2.** **a)** 27
**b)** 60
**c)** 144
**d)** 113
**e)** 165
**f)** 127

**3.** **a)** 111 oranges
**b)** 111 books
**c)** 125

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to add two-digit numbers with exchanging or renaming, using the two methods taught in this unit.

# Unit 7 Adding three-digit numbers

**Objectives**

By the end of this unit, pupils will be able to:

- Add three-digit numbers.

## Suggested resources

You will need to have:

- Coloured chalks
- Coloured counters
- Large 0 to 9 digit cards
- Abacuses

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to understand place value of three-digit numbers. They should know and use addition and subtraction facts to 20.

## Common errors pupils make

- Pupils will make occasional computational mistakes. They should be encouraged to check that their answers are reasonable.
- Pupils who persistently end up with a four-digit number when adding three-digit numbers requiring regrouping are probably not regrouping the ones total into tens and ones. They will need remedial work on place value and seeing two-digit numbers as their components, for example 13 as 10 + 3. They might also not be regrouping the tens total into hundreds and tens. They will need remedial work on place value and understanding how many tens in three-digit numbers and understanding ten groups often make 100.

## Evaluation guide

Assess that pupils can:

- Add two given three-digit numbers using exchanging or renaming.

## Lesson 1 *Pupil's Book page 30*

### Preparation

You will need to have:
- Coloured chalks
- Coloured counters
- Pupil's Book

### Starter activity

*Play Target 200*. The object of the game is to reach as close to the sum of 200 as possible. Take a set of digit cards 1 to 9. Explain that five digit cards are going to be drawn from the set, one at a time. As each is drawn the pupils must decide whether it is going to be a ones or a tens number. For example, if 3 is drawn will the pupils use it as 3 or 30? Each time a card is drawn, the pupils must write down their number (either a ones or a tens number). After five draws, the pupils total their numbers. Closest to 200 wins the game. Repeated playing of the game allows the pupil to develop the strategies of mentally adding numbers to keep a running total and estimating, gradually learning which digits to use as ones and which as tens as the numbers unfold.

### Lesson focus

Ask the pupils to expand the number 468 and record 400 + 60 + 8.
Ask the pupils to expand the number 377 and record 300 + 70 + 7.
Ask the pupils to add up all the hundreds: record 400 + 300 = 700.
Add up all the tens: record 60 + 70 = 130.
Add up all the ones: record 8 + 7 = 15.

Use three different colour counters to illustrate. Ask the pupils what they notice about the tens group and the ones group. Ask them to suggest how they are going to manage this. For some pupils, coping with two regroupings can be somewhat difficult; others find it very easy. Work through, modelling with equipment and recording on the board: 700 + 130 + 15 = 700 + 100 + 30 + 10 + 5. Collect all the hundreds, all the tens and all the ones: 800 + 40 + 5 = 845.

Work through the example on page 30 of the Pupil's Book for further practice. Give pupils a few more examples and allow them to work in pairs explaining to each other or using the coloured counters. For example: 368 + 374; 485 + 297.

Ask pupils to complete Exercise 1 (Pupil's Book page 30). Give further examples if required and allow pupils to use counters if required to begin with. However, to make further progress in mathematics it is expected they will be able to understand how the numbers work without using counters.

### Answers

**Exercise 1**

**1.** 420
**2.** 511
**3.** 802
**4.** 601
**5.** 601
**6.** 998

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to add three-digit numbers by writing them in expanded form and regrouping the ones and tens.

**Extension activity**

Pupils can work in pairs and try to add these four-digit numbers: 3 241 + 1 358.

**Support activity**

Allow pupils who are struggling to work with pupils who can assist them with their thinking (not do it for them). Monitor the pupils who are struggling and provide them with overlay cards if necessary to help them expand three-digit numbers before adding.

## Lesson 2 *Pupil's Book page 31*

### Preparation

You will need to have:

- Coloured chalks
- Large 0 to 9 digit cards
- Pupil's Book

### Starter activity

Use a set of large 0 to 9 digit cards. Spread the cards out on the floor (or fix them to the board, but they must be moveable). Ask pupils to make three-digit numbers using the cards. Each card can be used only once. You could ask:

- Make a three-digit number greater than 564.
- Make a three-digit number less than 321.
- Make a number between 278 and 483.

### Lesson focus

This lesson uses the column method taught in Unit 6 to add three-digit numbers. Explain to pupils that the method is the same when used with three-digit numbers. Start by working through the example on page 31 of the Pupil's Book – adding 249 and 364 using the column method. Make sure that pupils understand how to put the numbers in the correct columns (hundreds, tens and units) and that they leave enough space between digits. You can use coloured chalk to distinguish between the different columns.

Now repeat the same examples used in Lesson 1, but this time ask pupils to use the column method: 368 + 374; 485 + 297. They can use coloured pens or pencils to help them distinguish between the different columns.

Complete Exercise 2 (Pupil's Book page 31), emphasising the importance of setting out each question neatly and clearly.

### Answers

**Exercise 2**

**1.** 590
**2.** 800
**3.** 801
**4.** 245
**5.** 752
**6.** 705

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add two given three-digit numbers using columns.

**Extension activity**

Give pupils two four-digit numbers to add in columns, such as 4 237 + 1 952.

**Support activity**

Work with any pupils who are struggling to add three-digit numbers in columns and go back to working with two-digit numbers. Practise a few examples with them, using an abacus if it helps them to visualise the problem. Once they have mastered adding two-digit numbers, move on to three-digit numbers, showing them that the same principles apply.

## Lesson 3 *Pupil's Book page 32*

### Preparation

You will need to have:

- Coloured chalks
- Abacuses
- Pupil's Book

### Starter activity

Have the pupils make themselves a numbered bingo card. On a piece of paper, a page in a book or a piece of card, draw a grid three by three squares. Write a list of numbers zero to nine, all the decade words from ten to ninety, and the word hundred on the board. The pupils choose nine words from the lists to write one in each of their boxes on their grid. (This grid should be kept as it can be used again.) Call out a number word at random, preferably from small cards with the words written on them. If the pupils have the word on their grid they cover it with a counter or scrap of paper (home-made counters). The first pupil to complete their card is the winner. (If time is short the winner can be the first pupil to have completed a row, column or diagonal.)

### Lesson focus

Remind pupils how to use an abacus. This lesson focuses on using an abacus to add three-digit numbers. Work through the example on page 32 of the Pupil's Book, using an abacus to illustrate each step.

For extra practice, choose a few of the sums in Exercise 1 (Pupil's Book page 30) and do these as a class using an abacus, then ask pupils to do a few more sums in pairs using abacuses.

Complete Exercise 3 on page 33 of the Pupil's Book, asking pupils to draw an abacus for each number and for the answer.

### Answers

**Exercise 3**

**1.** 380
**2.** 580
**3.** 765
**4.** 582
**5.** 562
**6.** 910

**Challenge**

736 + 288 = 1 024.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to add three-digit numbers using abacuses.

**Extension activity**

Complete the challenge exercise on page 32 of the Pupil's Book.

## Lesson 4 *Pupil's Book page 33*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Play *Target 200* as in Lesson 1.

### Lesson focus

Start by revising the three methods covered in this unit: expanded form, using columns and using abacuses.

Read through the problems in Exercise 4 on page 33 of the Pupil's Book with the class. Allow the pupils to work in pairs to complete the exercise to encourage discussion and mathematical thinking. Support pupils where they need help. Allow them to choose which of the three methods they prefer to use for each problem.

### Answers

**Exercise 4**

**1.** 544
**2.** 402
**3.** 831
**4.** 604

**Puzzle**

123 + 987 = 1 110.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to add three-digit numbers from word stories using any of the three methods taught in this unit.

**Extension activity**

Complete the puzzle exercise on page 33 of the Pupil's Book.

**Support activity**

Give pupils a few extra word stories to practise, first helping them to interpret the word story and write an addition sum. For example: Fola has saved ₦134 and his sister has saved ₦207. How much money do they have altogether?

Or: In a school there are 328 girls and 294 boys. How many pupils are there altogether?

Encourage them to use the method they found most difficult during this unit and work with them to add the two numbers correctly using this method.

## Revision lesson for Unit 7

*Pupil's Book pages 30–33; Workbook page 16*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 7:

- Adding three-digit numbers with exchanging or renaming.

Complete Worksheet 7 (Workbook page 16)

### Answers

**Worksheet 7**

**1. a)** 645
**b)** 377
**c)** 643

**2. a)** 470
**b)** 881
**c)** 854
**d)** 354
**e)** 351
**f)** 952

**3. a)** 412
**b)** 639
**c)** 820
**d)** 545

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to add three-digit numbers with exchanging or renaming, using the methods taught in this unit.

# Unit 8 Adding three numbers together

**Objectives**

By the end of this unit, pupils will be able to:

- Add three numbers taking two at a time.

## Suggested resources

You will need to have:

- Coloured chalks
- Coloured dice

## Key word definitions

*sum:* the sum is the answer to an addition question

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be able to comfortably add two numbers using the methods taught in previous units.

## Common errors pupils make

Pupils will make occasional computational mistakes. They should be encouraged to check that their answers are reasonable.

## Evaluation guide

Assess whether pupils can:

- Add three given numbers taking two at a time.

## Lesson 1 *Pupil's Book page 34*

## Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

## Starter activity

Play *Target 200* as in the previous unit. Repeated playing of the game allows the pupils to develop the strategies of mentally adding numbers to keep a running total and estimating, gradually learning which digits to use as ones and which as tens as the numbers unfold.

## Lesson focus

When we add three numbers, we start by adding two numbers and then add the third number to the first answer to get our final answer. This lesson uses the same two methods taught in previous units – expanded form and columns.

Start by working through the examples on page 34 of the Pupil's Book. Use coloured chalks to distinguish between the tens and the units. Pupils should be comfortable with both methods by now – explain to them that the methods are exactly the same when we are adding three numbers, we just start with two and then add the third number to the sum of the first two.

The examples on page 34 start by adding 23 and 45, and then add 57 to the sum. Ask pupils to work in pairs and instruct half the pairs to first add 23 and 57, and then 45; and the other half to first add 45 and 57 and then 23.

They should notice that they all get the same answer, regardless of which two numbers they add first. Use this to explain that it doesn't matter how we group the numbers when adding three numbers, the final answer will be the same (this is called the associative property of addition).

Complete Exercise 1 (Pupil's Book page 35).

## Answers

**Exercise 1**

**1.** 201
**2.** 77
**3.** 143
**4.** 152
**5.** 201
**6.** 142
**7.** 159
**8.** 104
**9.** 156
**10.** 166

**Puzzle**

Total age = 128 years.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to add three given numbers taking two at a time.

**Extension activity**

Complete the puzzle exercise on page 35 of the Pupil's Book.

**Support activity**

Repeat Exercise 1 on page 35 of the Pupil's Book, this time using columns for questions 1 to 5 and expanded form for questions 6 to 10. Give pupils extra support and guidance where necessary.

# Lesson 2 *Pupil's Book page 35*

## Preparation

You will need to have:

- Coloured chalks
- Coloured dice
- Pupil's Book

## Starter activity

Play a game using three differently coloured dice, assigning one of the colours to be a 'tens dice' and two colours as 'units dice'. For example: throwing a six on this dice would count for 60, and throwing a 2 would count for 20. Pupils play in pairs and each pair throws three different coloured dice and add the numbers together (they should have two units and one tens number to add). The pupils should keep a running total of their scores and the first pupil whose total exceeds 500 wins. They can play again, this time making two of the dice count as 'tens dice' and only one as a units dice.

## Lesson focus

Start by revising the methods covered in this unit: expanded form and using columns, to find the sum of 33, 71 and 68.

Work through any questions that pupils struggled with in Exercise 1. If they need extra practice, ask them to redo questions 1 to 5 using the column method, and questions 6 to 10 using the expanded form method.

Complete Exercise 2 (Pupil's Book page 35).

## Answers

**Exercise 2**

**1.** 134
**2.** 119
**3.** 215

**Challenge**

Answers across: 119; 130; 119. Answers from top to bottom: 119; 109; 140.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add three numbers taking two at a time.

**Extension activity**

Complete the challenge exercise on page 35 of the Pupil's Book.

## Revision lesson for Unit 8

*Pupil's Book pages 34–35; Workbook page 17*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 8:

- Adding three given numbers by taking two at a time.

Make sure pupils are familiar with the key word definition for this unit:
*sum:* the sum is the answer to an addition question

Complete Worksheet 8 (Workbook page 17).

### Answers

**1. a)** 44
**b)** 64
**c)** 242
**2. a)** 234
**b)** 158
**c)** 786
**3. a)** 210
**b)** 220
**c)** 419

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to add three numbers by taking two at a time.

# Unit 9 Subtracting two-digit numbers with exchanging or renaming

**Objectives**

By the end of this unit, pupils will be able to:

- Subtract two-digit numbers with exchanging or renaming.

## Suggested resources

You will need to have:

- Coloured chalks
- Coloured counters

## Key word definitions

*subtraction:* the mathematical operation of taking one number away from another
*subtract:* to take one number away from another
*borrow:* to put a number into a different column
*difference:* the result of subtracting one number from another

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to have recall of number facts to ten. Pupils need to be able to expand numbers into tens and ones.

## Common errors pupils make

Pupils will make occasional computational mistakes. They should be encouraged to check that their answers are reasonable.

Subtraction causes more difficulty than addition as pupils need to be able to rename numbers. Their place-value construct must be solid enough to allow them to be flexible in moving tens into ones to rename numbers. This can be supported with equipment so that pupils can see what is happening with the numbers before they are expected to manipulate the numbers in their heads.

## Evaluation guide

Assess whether pupils can:

- Subtract two-digit numbers with exchanging and renaming.

## Lesson 1 *Pupil's Book page 36*

### Preparation

You will need to have:

- 0 to 9 digit cards
- Coloured counters
- Coloured chalks
- Pupil's Book

### Starter activity

Play *Target 80*. The object of the game is to reach as close to 80 as possible. Start with a set of digit cards one to nine. Explain to the pupils that five digit cards are going to be drawn from the set, one at a time. As each is drawn they must decide whether it is going to be a units number or a tens number. For example, if three is drawn, will they use it as 3 or 30? Each time a card is drawn the pupils must write down their number (either units or tens number). After five draws the pupils total their numbers. Closest to 80 wins the game. Repeated playing of the game allows the pupil to develop the strategies of mentally adding numbers to keep a running total and estimating, gradually learning which digits to use as ones and which as tens as the numbers unfold.

### Lesson focus

Ask pupils to expand the number 46. They should very easily be able to give you 40 + 6. Model 40 + 6 with counters. Ask: What would the numbers be if you moved a ten from the tens group into the ones group? 40 + 6 = 30 + 16.

Explain to the pupils that sometimes when doing calculations we can move parts of numbers around to make things easier for ourselves. Moving a ten is just another way of writing a number when performing a calculation, but we cannot leave a final number with more than nine in the units group. Exchanging numbers will be used for subtracting numbers. Practise exchanging using different coloured counters, for example red for tens and blue for units. Write these numbers on the board for pupils to exchange using counters: 38; 49; 23; 44.

Now work through the example on page 36 of the Pupil's Book, explaining to pupils why it is better to expand 96 as 80 + 16 than as 90 + 6.

Complete Exercise 1 (Pupil's Book page 36).

### Answers

**Exercise 1**

**1.** 26
**2.** 58
**3.** 16
**4.** 42
**5.** 15
**6.** 37
**7.** 9
**8.** 17
**9.** 19
**10.** 66

**Puzzle**

75 – 46 = 29 years.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract two-digit numbers with exchanging or renaming.

**Extension activity**

Complete the puzzle exercise on page 36 of the Pupil's Book.

**Support activity**
Some pupils may take time to grasp the concepts behind subtraction with expanding and renaming. Spend extra time with them, first practising exchanging using different coloured counters, asking pupils to expand each number in two different ways. For example:
42 = 40 + 2 = 30 + 12
67 = 60 + 7 = 50 + 17

Now make sure that they understand why they sometimes need to expand numbers in different ways in order to subtract, use these examples:
82 – 27: We need to expand 82 as 70 + 12 instead of 80 + 2, so that we can subtract 7 from 12.
34 – 19: We need to expand 34 as 20 + 14 instead of 30 + 4, so that we can subtract 9 from 14.

## Lesson 2 *Pupil's Book page 37*

### Preparation
You will need to have:
- Coloured chalks
- Pupil's Book

### Starter activity
Practise renaming numbers: for example 34 as 20 and 14. Pupils may need to expand it first 30 + 4 then rename to 20 + 14. Give several two-digit numbers to rename.

### Lesson focus
The column method for subtracting allows us to borrow from the next place value. This is the equivalent of renaming as practised in the starter activity. Ask pupils to rename 96 (80 + 16). Work through the example on page 37 of the Pupil's Book, explaining that we cannot subtract 9 from 6 because 9 is greater than 6; therefore, we borrow 10 from the tens column. This means we subtract ten from 90 leaving 8 tens, and add ten to the 6 units to give 16 units (which is the same as renaming the 96 as 80 + 16). Now we can subtract 9 from 16.

When they first start subtraction using borrowing, encourage your pupils to cross out the units and tens and write the whole new number above. As they become more confident, they can just write the value borrowed.

Work through a few more examples of subtraction using the column method, before completing Exercise 2 on page 37 of the Pupil's Book.

### Answers
**Exercise 2**

**1.** 27
**2.** 29
**3.** 47
**4.** 37
**5.** 36
**6.** 36

**Challenge**

Seventy-two packs are left. 90 – (3 × 6) = 90 – 18 = 72

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract two-digit numbers in columns, explaining why they need to borrow and how they are going about the processing of borrowing.

**Extension activity**

Challenge exercise on page 37 of the Pupil's Book.

## Lesson 3 *Pupil's Book page 37; Workbook page 18*

### Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

### Starter activity

Play *Target 80*, as in Lesson 1.

### Lesson focus

Revise the two methods covered in this unit – expanded form and using columns. Work through two examples of each, asking pupils to come up to the board and explain how they solve each question.

Pupils can complete Exercise 3 on page 37 of the Pupil's Book, using whatever method they prefer; ask them to use the method they find harder for at least three of the five questions in the exercise. If they need extra practice, ask them to repeat the exercise twice, first using expanded form and then columns.

### Answers

**Exercise 3**

**1.** 19
**2.** 38
**3.** 5
**4.** 34
**5.** ₦12

**Worksheet 9**

**3.** **a)** 19
**b)** 13
**c)** 46
**d)** 29

**Assessment**
Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract two-digit numbers using expanded form and the column method, explaining their steps as they go along.

**Homework activity**
Worksheet 9 question 3 (Workbook page 18). Answers above.

**Support activity**
Allow pupils to pair up and practise subtracting together, using the different methods taught in this unit. Monitor the pairs closely and give extra input to any pupils who need it.

## Revision lesson for Unit 9

*Pupil's Book pages 36–37; Workbook page 18*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 9:
- Subtracting two-digit numbers with exchanging or renaming.

Make sure pupils are familiar with the key word definitions for this unit:
- *subtraction*: the mathematical operation of taking one number away from another
- *subtract:* to take one number away from another
- *borrow:* to put a number into a different column
- *difference*: the result of subtracting one number from another

Complete Worksheet 9 question 1 and 2 (Workbook page 18).

### Answers

**Worksheet 9**

**1.** **a)** 33
**b)** 19
**c)** 26
**d)** 19
**e)** 26

**2.** **a)** 35
**b)** 18
**c)** 35
**d)** 56
**e)** 48
**f)** 41

**Assessment**
Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to subtract two-digit numbers with exchanging or renaming.

# Unit 10 Subtracting three-digit numbers

**Objectives**

By the end of this unit, pupils will be able to:

- Subtract three-digit numbers.

## Suggested resources

You will need to have:

- Place-value equipment (such as counters, coins, etc.)
- Coloured chalks
- Dice
- Large 0 to 9 digit cards
- Abacuses

## Key word definitions

*take away:* to subtract one number from another

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to understand place value of three-digit numbers. They should know and use addition and subtraction facts to 20. Pupils need to be able to use the knowledge of one hundred as ten tens.

## Common errors pupils make

Pupils will make occasional computational mistakes. They should be encouraged to check that their answers are reasonable.

Subtraction causes more difficulty than addition as pupils need to be able to rename numbers. Their place value construct must be solid enough to allow them to be flexible in moving tens into ones and hundreds into tens to rename numbers.

## Evaluation guide

Assess whether pupils can:

- Subtract three-digit numbers using expanded form, columns and abacuses.

## Lesson 1 *Pupil's Book page 38*

## Preparation

You will need to have:

- Place value equipment (such as counters; coins, etc.)
- Coloured chalks
- Pupil's Book

## Starter activity

Play *Guess My Number Skeleton*. Draw three horizontal lines on the board on which to write the three digits of the number. Pupils must guess the hundreds digit by asking, for example, 'Is it 300?' (not 3). If it is, write the 3 in the hundreds column. If it is not, then draw a bone on the skeleton. When the hundreds digit has been identified, they must then guess the tens number by asking, for example, 'Is it 40?' (not 4). Once the tens digit has been identified, they can guess the ones digit. (Stick-man drawing – you can decide the amount of detail before completion – if you complete the skeleton before the pupils have guessed the complete number you win, they lose.)

## Lesson focus

Pupils often find subtraction more difficult, which is why they need to understand the importance of renaming and are able to rename numbers when doing calculations.

Ask pupils to expand the number 582 into 500 + 80 + 2. Model the numbers using place-value equipment. (Money or pretend money provides good place-value equipment at this level using 100, 10 and 1 'notes'.)

Explain to the pupils that they are now required to take away 437. Taking away 400 from 500 is not a problem. Taking away 30 from 80 is not a problem. However, if you try and take away 7 from 2 this is not possible.

If something is not possible then we have to do something to the number to make it possible. We will have to rename the number: 82 needs to be renamed as 70 and 12. So the number we are working with is now 500 + 70 + 12. Show this 'new' expanded number with the equipment by moving a ten into the ones.

We can now carry out the calculation:
Work with hundreds: 500 – 400 = 100.
Work with tens: 70 – 30 = 40.
Work with ones: 12 – 7 = 5.
100 + 40 + 5 = 145.

You will probably need to work through a number of examples with the pupils before attempting the exercise. Remind them to first check to see which number needs renaming, before beginning the subtraction.

Allow pupils to work in groups with equipment and talk each other through what is happening with the numbers.

Work through the example on page 38 of the Pupil's Book for extra practice. If necessary, try a few other examples:
573 – 348;
486 – 233.

Pupils complete Exercise 1 (Pupil's Book page 38). Allow them to use place-value equipment to begin with if required. However, to make further progress in mathematics it is expected that pupils will be able to understand how the numbers work without using equipment.

## Answers

**Exercise 1**

**1.** 169
**2.** 129
**3.** 178
**4.** 252
**5.** 208
**6.** 214
**7.** 344
**8.** 557
**9.** 258
**10.** 358

**Extensions**

**1.** 226
**2.** 318
**3.** 335
**4.** 537
**5.** 437

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Expect pupils to be able to explain what is happening with the numbers not just getting a right answer. Pupils should be able to subtract three-digit numbers requiring renaming of tens and ones.

**Extension activity**

Give pupils further examples to practise:
**1.** 463 – 237 =
**2.** 644 – 326 =
**3.** 862 – 527 =
**4.** 965 – 428 =
**5.** 866 – 429 =

**Support activity**

If pupils are struggling to subtract three-digit numbers, first give them extra practice with two-digit numbers and then show them that the same principles apply for three-digit numbers. Work with a smaller group of pupils and slowly work through the extra examples given in the extension activity above.

## Lesson 2 *Pupil's Book page 39*

### Preparation

You will need to have:

- Set of dice
- Coloured chalks
- Pupil's Book

### Starter activity

Practise renaming three-digit numbers: for example 324 as 200 + 120 + 4. Pupils may need to expand it first: 300 + 20 + 4, then rename to 200 + 120 + 4. Give a number of three-digit numbers to rename.

### Lesson focus

Write on the board 451 – 136 (the example on page 39 of the Pupil's Book). Explain that we are going to use the same method we used in Unit 9 (subtracting in columns) to subtract three-digit numbers.

Write 136 underneath 451, making sure to line up the units, tens and hundreds correctly. Use coloured chalk to distinguish between the columns. We always start with the units. We cannot subtract 6 from 1, so we borrow from the tens. Now we have 11 – 6 = 5. Explain that this step is the same as renaming 451 as 400 + 40 + 11 instead of 400 + 50 + 1.

Complete the example and do a few more examples for extra practice, such as:
523 – 376 =
361 – 183 =
435 – 269 =

Pupils complete Exercise 2 (Pupil's Book page 39).

### Answers

**Exercise 2**

**1.** 225
**2.** 327
**3.** 274
**4.** 395
**5.** 543
**6.** 254

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract three-digit numbers in columns.

**Homework activity**

Pupils can complete Exercise 2 for homework if they have not completed it in class.

## Lesson 3 *Pupil's Book page 40*

### Preparation

You will need to have:

- Large 0 to 9 digit cards
- Abacuses
- Coloured chalks
- Pupil's Book

### Starter activity

Using a set of large 0 to 9 digit cards, spread the cards out on the floor (or fix them to the board, but they must be moveable). Ask pupils to make three-digit numbers using the cards. Each card may be used only once. You could ask pupils: Make the largest three-digit number you can; make the smallest three-digit number you can; make a number that is between 134 and 256 (or any two numbers of your choice).

This activity could also be done by writing the digits 0 to 9 on the board and asking the pupils to record the answer or possible answer to each question. It is good for them to see that there is not always just one correct answer. If using this method, it is important for pupils to share their answers after each question has been asked.

### Lesson focus

Remind pupils that an abacus visually depicts the hundreds, tens and units digits of a three-digit number, and ask them to use an abacus to illustrate a few three-digit numbers. Remind them how we used an abacus to add three-digit numbers. Now explain to pupils how to rename and exchange using an abacus. For example: 313 becomes 3 hundreds, 0 tens and 13 units; and 248 becomes 2 hundreds, 3 tens and 18 units.

When we use an abacus for subtraction, we swap the beads when we borrow. We always start with the units. Work through the example on page 40 of the Pupil's Book, as well as a few other examples for extra practice, such as:
423 – 147;
681 – 345;
543 – 277.

Complete Exercise 3 (Pupil's Book page 40), asking pupils to draw an abacus for each answer. Give pupils abacuses to use in their calculations.

### Answers

**Exercise 3**

**1.** 332
**2.** 45
**3.** 221
**4.** 188
**5.** 219

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract three-digit numbers using an abacus.

**Extension activity**

Pupils can complete the puzzle exercise on page 39 of the Pupil's Book, using an abacus. Teacher to check answers.

**Support activity**

Use an abacus to work through these four examples with pupils who need extra support: 432 – 171; 432 – 227; 432 – 167; 432 – 321.

Discuss the different ways to expand 432 and allow pupils to select which expansion they will use for each example above.

## Lesson 4 *Pupil's Book page 41*

### Preparation

You will need to have:

- Set of dice
- Abacuses
- Coloured chalks
- Pupil's Book

### Starter activity

Pupils can play the game described in the challenge exercise on page 39 of the Pupil's Book.

### Lesson focus

Start the lesson by revising the three methods covered in this unit – expanded form; columns and using abacuses. Ask pupils which method they prefer and which they find the most difficult. Instruct pupils to do two sums in Exercise 4 (Pupil's Book page 41) using the method they find harder between expanded form or the column method, and one sum using an abacus. The remainder can be done using whatever method they prefer.

Read through the problems in Exercise 4 with the class. Allow the pupils to work in pairs to encourage discussion and mathematical thinking. Support pupils where they need help.

Complete Exercise 4 (Pupil's Book page 41).

### Answers

**Exercise 4**

**1.** 507
**2.** 391
**3.** 389
**4.** 154
**5.** 175 g
**6.** 135
**7.** 314

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract three-digit numbers in word stories using all three methods taught in this unit – expanded form, columns and using abacuses.

**Extension activity**

Ask pupils to write a word problem to solve, using addition and another using subtraction, each involving three-digit numbers. They can swap with a partner and solve each other's word problems.

**Support activity**

Work closely with pupils who need extra support and revise the three methods taught in this unit. Allow them to use the method they feel most comfortable with at first, but gradually encourage them to use the one they found most difficult and spend time helping them with this method.

## Revision lesson for Unit 10

*Pupil's Book pages 38–41; Workbook page 19*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 10:

- Subtracting three-digit numbers.

Make sure pupils are familiar with the key word definition for this unit:

- *take away*: to subtract one number from another

Complete Worksheet 10 (Workbook page 19).

### Answers

**Worksheet 10**

**1. a)** 123
**b)** 207
**c)** 389
**d)** 178
**e)** 444

**2. a)** 598
**b)** 158
**c)** 519
**d)** 518
**e)** 604
**f)** 288

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Workbook. Pupils should be able to subtract three-digit numbers with exchanging or renaming.

# Unit 11 Subtract three numbers together

**Objectives**

By the end of this unit, pupils will be able to:

- Subtract three numbers taking two at a time.

## Suggested resources

You will need to have:

- Coloured chalks
- Dice

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be able to confidently subtract two numbers using the methods taught in previous units.

## Evaluation guide

Assess whether pupils can:

- Subtract three given numbers taking two at a time.

Common errors pupils make

- Pupils may struggle with subtracting a larger digit from a smaller one, for example 15-9. Show pupils that they can borrow ten from the tens column, so the sum becomes 15-9 instead of 5-9.
- Pupils may make mistakes with basic arithmetic. Encourage pupils to check their own work to make sure their calculations are correct. You could also pair up pupils to check each other's working.

## Lesson 1 *Pupil's Book page 42*

## Preparation

You will need to have:

- Dice
- Coloured chalks
- Pupil's Book

## Starter activity

Play *Subtraction 100* in pairs. Each pair needs two dice and a grid containing the two-digit numbers 34 to 39; 44 to 49; 54 to 59; 64 to 69; 74 to 79; 84 to 89 (they can copy the grids into their books or you can hand out copies). The first pupil throws two dice and forms a two-digit number. Subtract the two-digit number from 100 and colour in the answer in the grid with their own coloured pencil. For example if 3 and 4 are thrown, the two-digit number could be 34 or 43, and the coloured-in number could be 66 or 57. If both of the possible answers are already coloured in, the pupil has to miss a turn. The pupil with the most coloured-in answers wins.

## Lesson focus

Remind pupils of how we added three given numbers by first adding two of the numbers and then adding the third to get our final answer. We will apply the same strategy to subtract three given numbers. We start with the first two numbers and subtract the third number from our first answer.

Work through the example on page 42 of the Pupil's Book. When subtracting 25 from 51, we expand 51 into 4 tens and 11 units because we cannot subtract 5 from 1. By now pupils should be comfortable renaming two-digit numbers in this way. This gives us the answer of 26 (2 tens and 6 units). We now subtract 16 from 26, to get 10.

Practise a few more examples, such as:
43 – 18 – 24
71 – 27 – 14
84 – 39 – 18.

Complete Exercises 1 and 2 (Pupil's Book pages 42–43).

## Answers

**Exercise 1**

**1.** 18
**2.** 140
**3.** 455
**4.** 29
**5.** 358

**Exercise 2**

**1.** 38; 20
**2.** 75; 60
**3.** 46; 27
**4.** 153; 62
**5.** 168; 60
**6.** 257; 109

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to subtract three given numbers using expanded form. Make sure they are comfortably able to rename two-digit numbers in order to subtract.

**Homework activity**

Pupils can complete Exercise 2 for homework if they have not completed it in class.

**Support activity**

Spend time making sure they pupils are comfortably able to rename two-digit numbers in order to subtract. Give pupils one set of cards with different expansions (e.g. 30 + 12; 40 + 7) and another set with two-digit numbers (42; 47) and ask them to match the numbers with their expansions.

## Lesson 2 *Pupil's Book page 44*

### Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

### Starter activity

Using a set of large 0 to 9 digit cards, spread the cards out on the floor (or fix them to the board, but they must be moveable). Ask pupils to make three-digit numbers using the cards. Each card can be used only once. You could ask pupils to: make the largest three-digit number you can; make the smallest three-digit number you can; make a number that is between 134 and 256 (or any two numbers of your choice).

This activity could also be done by writing the digits 0 to 9 on the board and asking the pupils to record the answer or possible answer to each question. It is good for them to see that there is not always just one correct answer. If using this method, it is important for pupils to share their answers after each question has been asked.

### Lesson focus

In Unit 8 we learned how to use columns to add three numbers. In this lesson we will use columns to subtract three numbers, starting with two numbers and then subtracting the third from our first answer to get our final answer. Work through the example on page 44 of the Pupil's Book: 786 – 594 – 139.

Remind pupils to label their hundreds, tens and units columns clearly, and to use coloured pencils to distinguish between the columns if it helps them. Use this example to remind pupils of the principles involved in borrowing. In this example, we cannot take 9 from 8 (in the tens column), so we must borrow 1 from the hundreds leaving 6 hundreds and 18 tens.

Work through a few more examples if necessary, asking a few pupils to come up to the board and do the examples explaining as they go along.
81 – 25 – 37
437 – 291 – 107

Complete Exercise 3 (Pupil's Book page 44).

### Answers

**Exercise 3**

**1.** 20
**2.** 28
**3.** 49
**4.** 23
**5.** 10
**6.** 515
**7.** 230
**8.** 268
**9.** 405
**10.** 137

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to subtract three given numbers in columns, taking two first and then subtracting the third from their first answer. They should demonstrate a clear understanding of the principles behind borrowing and be able to explain each step as they go along.

**Extension activity**

Pupils can complete the puzzle exercise on page 42 of the Pupil's Book (answer is 35 m).

## Lesson 3 *Pupil's Book page 44*

### Preparation

You will need to have:

- Coloured chalks
- Pupil's Book

### Starter activity

Revise a subtraction equation: 453 – 268 =
Expand the first number and rename as necessary: 400 + 50 + 3.
We cannot take away 8, so rename to: 400 + 40 + 13.
We cannot take away 60, so rename to: 300 + 140 + 13.
Now we can take away: 300 – 200 = 100; 140 – 60 = 80; 13 – 8 = 5.
Join the parts back together: 100 + 80 + 5 = 185.

Now ask pupils to do the same equation again, using the column method.

### Lesson focus

Read through the questions in Exercise 4 (Pupil's Book pages 44–45) before asking pupils to complete the exercise. Let your pupils work in pairs to decide how to write each sum out in figures before doing the calculations. Check their understanding before allowing them to continue, using whichever method of subtraction they prefer. If they seem to be struggling with one of the methods, ask them to use that method for most of the questions to get extra practice.

### Answers

**Exercise 4**

**1.** 51 mangoes
**2.** 100 students
**3.** 97 pencils
**4.** 27 litres
**5.** 75

**Challenge**

The missing numbers from top to bottom are: 59; 52; 40.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercise in the Pupil's Book. Pupils should be able to solve subtraction word stories involving three given numbers.

**Extension activity**

Complete the challenge exercise on page 45 of the Pupil's Book.

**Support activity**

Ask pupils to make up their own subtraction word story. Spend time helping them carry out the subtraction using whatever method they found most difficult during this unit.

## Revision lesson for Unit 11

*Pupil's Book pages 42–45; Workbook page 20*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 11:

- Subtracting three numbers taking two at a time.

Complete Worksheet 11 (Workbook page 20).

### Answers

**Worksheet 11**

**1.** **a)** 3
**b)** 3
**c)** 9

**2.** **a)** 11
**b)** 18
**c)** 109
**d)** 212

**3.** **a)** 58
**b)** 25
**c)** 23

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to subtract three numbers taking two at a time.

# Term 1 Investigation

**Objectives**

- This investigation forms part of a summative assessment of work covered in Units 1 to 11. It specifically provides the opportunity for pupils to use addition and subtraction when solving problems, including those involving money.
- The investigation is designed to assess pupils' mathematical understanding and ability to apply their knowledge in different contexts. It encourages investigative thinking and problem-solving.
- It is best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to the pupils and give them time to complete the question or activity in their group before moving on to the next question. The teacher should monitor individuals within the group to make sure all are participating and able to answer the questions.

## Part 1: Close to 100

*Pupil's Book page 46*

### Preparation

You will need to have:

- Number cards from 5 to 95 in multiples of five
- Scorecards
- Pupil's Book

### Starter activity

Write the numbers 45, 20 and 75 on the board. Ask pupils to put these numbers into a number sentence using addition and/or subtraction to make a number as close to 100 as they can. Ask one pupil to demonstrate their answer. The solution should be:
75 + 45 – 20 = 100
(75 + 45 = 120, 120 – 20 = 100).

Write the numbers 10, 30 and 85 on the board and ask pupils to repeat the task using these numbers. Can you make 100 exactly? How close can you get? Ask one pupil to show their working. The best solution should be: 85 + 30 – 10 = 105. What is the difference between 105 and 100? (5)

### Guidelines

Ask pupils to look at the investigation in their Pupil's Books (page 46). Read the instructions for this game together, and answer any questions pupils may have. Ensure that each pupil is in a pair or group of three and has a scorecard. Give each pair or three a set of number cards and ask them to start the game.

**Assessment**

Observe and listen to the pupils during the lesson. Pupils should be able to use addition and subtraction facts to solve problems.

## Part 2: Feed the family *Pupil's Book page 47*

### Preparation

You will need to have:

- Pupils' Book

### Starter activity

Ask pupils a number of quick-fire addition, subtraction, multiplication and division problems.

### Guidelines

Read through the instructions on page 47 of the Pupil's Book with pupils. Tell the pupils that yams cost ₦10 for 1 kg. They can complete this part of the investigation on their own. Help those who need extra support and guide them to use the addition and subtraction strategies learnt in this unit.

### Answers

**1.** ₦145
**2.** ₦55
**3.** 5 bunches of bananas; 5 kg of yams; 5 bags of tomatoes; 5 chickens; 5 tubs of ice-cream; 5 bottles of orange juice
**4.** Bananas – ₦75; Yams – ₦50; Tomatoes – ₦150; Chicken – ₦150; Ice-cream – ₦100; Orange juice – ₦200
**5.** ₦725
**6.** ₦275

# Term 1 Assessment

**Objectives**

- This assessment is a summative assessment of work covered in Units 1 to 11.
- This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a pupil may be having with particular concepts.

## Guidelines

It is therefore best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to the pupils and give them time to complete the question before moving on to the next question.

A more able group within the class may be able to complete the assessment without the teacher to reading the questions. However, observing pupils while they are completing the assessment, provides further information about their abilities.

On completion of the assessment, teachers should look for correct answers and mistakes made by individuals. They should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an assessment, teachers can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities. They are also able to identify any weaknesses in their teaching programme and make adjustments as necessary.

## Preparation

You will need to have:

- Pupils' Book

## Answers

**1.** Teacher to check.
**2.** Teacher to check.
**3.** Teacher to check.
**4.** 100; 200; 300; 500; 600; 800
**5.** **a)** 7 hundreds, 4 tens, 5 units
**b)** 9 hundreds, 0 tens, 6 units
**6.** **a)** 40
**b)** 5
**c)** 900
**d)** 0
**7.** There should be 7 beads in the hundreds column, 5 in the tens and 9 in the units.
**8.** **a)** $243 < 310$
**b)** $438 > 358$
**c)** $799 > 651$
**d)** $650 > 298$
**9.** 20
**10.** $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$
**11.** **a)** $\frac{1}{2}$
**b)** $\frac{1}{4}$
**c)** $\frac{1}{3}$
**d)** $\frac{1}{5}$
**12.** **a)** $\frac{1}{3} > \frac{1}{4}$
**b)** $\frac{1}{5} < \frac{1}{4}$
**c)** $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} > \frac{1}{2}$
**13.** $\frac{1}{4}$ of 32
**14.** **a)** 151
**b)** 144
**15.** **a)** 113
**b)** 892
**16.** 150
**17.** **a)** 47
**b)** 222
**18.** 48

# Unit 12 Adding fractions

**Objectives**

By the end of this unit, pupils will be able to:

- Add fractions with the same denominator.

## Suggested resources

You will need to have:

- Paper strips
- Pupil's Book
- Workbook

## Key word definitions

*common:* when fractions have a common denominator they have the same denominator

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be able to read and write unit fractions, and recognise unit fractions of shapes and sets.

## Common errors pupils make

Fractions are a very hard concept, and pupils require plenty of practical experience to grasp the concepts because they do not follow the same rules as whole numbers. Pupils need to eventually make a mind shift to understand fractions as it requires dealing with two things at the same time in relation to each other: the number of equal parts, and then how many of the equal parts, which is the focus of this unit. The concepts require the pupils to link the two concepts together.

## Evaluation guide

Assess whether pupils can:

- Add fractions with the same denominator.

## Lesson 1 *Pupil's Book page 50*

### Preparation

You will need to have:

- Paper strips
- Pupil's Book

### Starter activity

Write unit fractions on the board: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$. Ask the pupils to explain what each number means and which fraction is the largest. Draw some shapes on the board, for example a circle, a square, a triangle and a rectangle. Invite pupils to come and mark the shapes into a specific fraction. For example, ask a pupil to mark the circle into quarters.

### Lesson focus

Draw a circle on the board and divide it into eighths. Shade three-eighths; write underneath the circle $\frac{3}{8}$. Now shade in another two-eighths in a different colour, and write + $\frac{2}{8}$ after $\frac{3}{8}$.

Ask what fraction is shaded altogether? (Five-eighths) Complete the equation $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$.

Give the pupils a paper strip and ask them to fold it into sixths. (Can they remember to fold into thirds and then in half again to make sixths?) Unfold the piece of paper and draw a line on each fold. Shade in $\frac{1}{6}$ of the paper in one pattern and shade $\frac{3}{6}$ of the paper in another pattern.

Write on the board: $\frac{1}{6} + \frac{3}{6} =$ . Ask what fraction of your paper is shaded? $\frac{4}{6}$

Repeat with other numbers, until pupils become confident with the concept. Work through the example on page 50 of the Pupil's Book and then complete the first four questions of Exercise 1 on page 51.

### Answers

**Exercise 1**

1. $\frac{3}{4}$
2. $\frac{4}{5}$
3. $\frac{5}{6}$
4. $\frac{4}{5}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add fractions using diagrams.

**Extension activity**

Challenge the pupils to time themselves counting to 1 000 in ones. Just for fun, can they count backwards from 1 000 back to one?

**Support activity**

Some pupils may struggle to draw their own diagrams to help them add fractions. Give these pupils diagrams to help them add fractions, and once they have mastered working from a given diagram, ask them to repeat Exercise1 (Pupil's Book page 51) for extra practice, this time drawing their own diagrams.

## Lesson 2 *Pupil's Book page 51*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Revise the concepts of numerator and denominator with your pupils. Write a number of fractions on the board and ask them to identify the numerators and denominators. Also ask pupils to group the fractions with the same denominators and explain that we call these common denominators.

### Lesson focus

Where fractions have a common denominator, we add the fractions and put the result over the common denominator.

Work through the example on page 50 in the Pupil's Book. Look at the fractions in the equation and note that the numerators have been added together but the denominator has not changed. Ask for an explanation of why the denominator hasn't changed. The response should include the observation that the question is talking about sixths and the parts added together are sixths and the result of the addition is also in sixths. The denominator is the name of the fraction – we don't add the names. For example, 3 oranges + 2 oranges = 5 oranges – we only add the number part, which in fractions is given by the numerator.

Work through a few more examples. When you are satisfied that they understand that when adding 'like' fractions (those with the same denominators or names), the numerators are added together but the denominator stays the same, ask pupils to complete the last four questions of Exercise 1 and Exercise 2 on page 51 in the Pupil's Book.

### Answers

**Exercise 1**

**5.** $\frac{4}{5}$

**6.** $\frac{5}{6}$

**7.** $\frac{5}{6}$

**8.** $\frac{3}{4}$

**Exercise 2**

**1.** 6 shelves

**2.** $\frac{2}{6}$

**3.** $\frac{3}{6}$

**4.** $\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$

**5.** $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

**Support**

**1.** $\frac{3}{4}$

**2.** $\frac{7}{8}$

**3.** $\frac{4}{5}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add fractions with the same denominator without using diagrams.

**Extension activity**

Pupils can complete the puzzle on page 50 in the Pupil's Book without using a diagram. (Answer: each child gets ₦8 and Grandma has ₦8 left.)

**Support activity**

If pupils are struggling to add fractions without using a diagram, help them to identify the common denominator and make sure that they know not to add the denominators, only the numerators. Give them these questions for extra practice, making sure that they first write down the common denominator and then add the numerators

**1.** $\frac{1}{4} + \frac{2}{4} =$

**2.** $\frac{3}{8} + \frac{4}{8} =$

**3.** $\frac{2}{5} + \frac{2}{5} =$

## Revision lesson for Unit 12

*Pupil's Book 50–51, Workbook pages 21–22*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 12:
- Adding fractions with the same denominator.

Make sure that pupils are familiar with the key word definitions for this unit:
- *common:* when fractions have a common denominator they have the same denominator

Complete Worksheet 12 (Workbook pages 21–22).

### Answers

**Worksheet 12**

**1.** Teacher to check that correct fractions are shaded.

**2.** **a)** $\frac{2}{3}$

**b)** $\frac{4}{5}$

**c)** $\frac{3}{4}$

**d)** $\frac{5}{6}$

**e)** $\frac{3}{3} = 1$

**f)** $\frac{2}{2} = 1$

**3.** **a)** $\frac{2}{4}$

**b)** $\frac{3}{5}$

**c)** $\frac{5}{6}$

**d)** $\frac{5}{6}$

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to add fractions with the same denominator.

# Unit 13 Subtracting fractions

**Objectives**

By the end of this unit, pupils will be able to:

- Subtract fractions with the same denominator.

## Suggested resources

You will need to have:

- Cardboard
- Pupil's Book
- Workbook

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be able to identify and add fractions with like denominators.

## Common errors pupils make

Fractions are a very hard concept, and pupils require plenty of practical experience to grasp the concepts because they do not follow the same rules as whole numbers. Pupils need to eventually make a mind shift to understand fractions as it requires dealing with two things at the same time in relation to each other: the number of equal parts, and then how many of the equal parts, which is the focus of this unit. The concepts require the pupils to link the two concepts together.

## Evaluation guide

Assess whether pupils can:

- Subtract fractions with the same denominator.

## Lesson 1 *Pupil's Book page 52*

### Preparation

You will need to have:

- Paper circles
- Pupil's Book

### Starter activity

Play *Make Three*: For each player you will need three circles of paper. Cut each circle into eighths. You will also need to make some small cards with instructions on them.

- Make four cards with 'Take 2 pieces' written on them.
- Make four cards with 'Take 1 piece' written on them.
- Make two cards with 'Take 3 pieces' written on them.
- Make two cards with 'What is your fraction?' written on them.

To play the game, put all the eighths pieces in the middle of the table and mix the cards face down on the table. Player 1 turns over a card and takes the correct number of pieces. Player 2 does the same. If a 'What is your fraction?' card is turned up the player does not take any more pieces but must state the fraction they have in front of them. The winner is the person who has built exactly three whole circles. If a player goes over the three then they lose.

### Lesson focus

Start by discussing with your pupils the way in which we can write whole numbers as fractions, using the example of a cake as on page 52 in the Pupil's Book. Ask pupils to write the number 1 as a fraction with a denominator of 2, 3, 4 and 5 to practise.

Draw a circle on the board and divide it into eighths. Ask pupils what fraction the whole circle represents ($\frac{8}{8}$). Shade three-eighths; write underneath the circle $\frac{3}{8}$. Now ask pupils how many eighths are not shaded. (Five-eighths.) Complete the equation $\frac{8}{8} - \frac{3}{8} = \frac{5}{8}$.

Work through the example in the Pupil's Book on page 52. Explain to pupils that in this example we are not subtracting from a whole, but from part of a whole. Complete Exercise 1 on page 52. Pupils may need some assistance with drawing their diagrams at first.

### Answers

**Exercise 1**

1. $\frac{3}{6}$
2. $\frac{2}{5}$
3. $\frac{1}{4}$
4. $\frac{3}{5}$
5. $\frac{1}{2}$
6. $\frac{1}{3}$

**Puzzle**

She kept $\frac{1}{3}$ for her family.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to subtract fractions with the same denominator using diagrams.

**Extension activity**

Pupils can complete the puzzle on page 52 in the Pupil's Book.

**Support activity**

Some pupils may need extra support rewriting 1 as a fraction. Spend time practising this with them, using a variety of denominators.

## Lesson 2 *Pupil's Book page 53*

### Preparation

You will need to have:

- Cardboard
- Pupil's Book

### Starter activity

Ask pupils to cut a piece of card into eight equal pieces. Take two parts and ask pupils how they write the fraction $\frac{2}{8}$. Take another three parts which is $\frac{3}{8}$. Ask them to add all the parts. The number of parts collected is $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$.

Ask pupils what fraction is left over. The fraction left over is $\frac{8}{8} - \frac{5}{8} = \frac{3}{8}$.

### Lesson focus

Where fractions have a common denominator, we subtract the fractions and put the result over the common denominator.

Work through the example on page 53 in the Pupil's Book. Look at the fractions in the equation and note that the numerators have been subtracted but the denominator has not changed. Ask for an explanation of why the denominator hasn't changed. Pupils should remember this from Unit 12 and should be able to explain that the question is talking about quarters and the parts added together are quarters and the result of the subtraction is also in quarters. The denominator is the name of the fraction – we don't add or subtract the names. For example, taking away one apple from three apples leaves two apples – we only add or subtract the number part, which in fractions is given by the numerator.

Work through a few more examples. When you are satisfied that pupils understand that when subtracting 'like' fractions (those with the same denominators or names), the numerators are subtracted but the denominator stays the same, ask pupils to complete Exercises 2 and 3 on page 53 in the Pupil's Book.

### Answers

**Exercise 2**

**1.** $\frac{3}{6}$

**2.** $\frac{2}{5}$

**3.** $\frac{1}{4}$

**4.** $\frac{3}{5}$

**5.** $\frac{1}{2}$

**6.** $\frac{1}{3}$

**Exercise 3**

**1.** 5 biscuits = $\frac{3}{5}$

**2.** 2

**3.** $\frac{2}{5}$

**4.** $\frac{3}{5}$

**Challenge**

There are 12 sweets left.

**Support**

**1.** $\frac{4}{8}$

**2.** $\frac{2}{5}$

**3.** $\frac{2}{6}$

**4.** $\frac{3}{4}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to subtract fractions with the same denominator without using diagrams.

**Extension activity**

Pupils can complete the challenge on page 53 in the Pupil's Book without using a diagram.

**Support activity**

Extra practice questions for those who need them:

**1.** $\frac{5}{8} - \frac{1}{8} =$

**2.** $1 - \frac{3}{5} =$

**3.** $\frac{5}{6} - \frac{3}{6} =$

**4.** $1 - \frac{1}{4} =$

## Revision lesson for Unit 13

*Pupil's Book pages 52–53; Workbook page 23*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 13:

- Subtracting fractions with the same denominator.

Complete Worksheet 13 (Workbook page 23).

### Answers

**Worksheet 13**

**1. a)** $\frac{2}{4}$

**b)** $\frac{1}{5}$

**c)** $\frac{2}{6}$

**d)** $\frac{1}{3}$

**e)** $\frac{2}{6}$

**f)** 0

**2. a)** $\frac{1}{4}$

**b)** $\frac{2}{5}$

**c)** $\frac{1}{6}$

**d)** $\frac{3}{5}$

**3. a)** $\frac{6}{6}$

**b)** $\frac{3}{6}$

**c)** $\frac{3}{6}$

**d)** $\frac{3}{6}$

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to subtract fractions with the same denominator with and without a diagram.

# Unit 14 Multiplying two-digit numbers

**Objectives**

By the end of this unit, pupils will be able to:

- Multiply from 1 × 1 to 9 × 9.
- Multiply a two-digit number by a one-digit number.

## Suggested resources

You will need to have:

- Small items for counters such as buttons, beads, coins, etc.
- Multiplication cards
- Small 0 to 9 digit cards
- Coloured chalk
- Pupil's Book
- Workbook

## Key word definitions

*multiply:* to add a number to itself a certain number of times

*product:* when we multiply two numbers together the answer is called the product

*multiplication:* the process of multiplying

*repeated addition:* to add a number to itself over and over

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should have recall of multiplication facts. Pupils should be able to add and subtract two-digit numbers. Pupils should have a good understanding of place value. Pupils should know the value of digits in each column. Pupils should understand the importance of 10. Pupils should know the number of tens in hundreds.

## Common errors pupils make

Pupils may have memorised the result of multiplication equations without understanding the concepts of multiplication. Multiplication is repeated addition, and it has commutative and distributive properties. Pupils who continue to experience difficulties with these concepts will need close monitoring and support in learning the concepts, not just in memorising the multiplication tables.

When multiplying two-digit numbers, errors occur where pupils do not have a firm foundation of prior knowledge. In particular, they require a firm construct of the place-value system and the importance of ten in order to able to rename a number in a variety of ways or to regroup a number from parts.

## Evaluation guide

Assess whether pupils can:

- Carry out given multiplications from 1 × 1 to 9 × 9.
- Multiply a given two-digit number by a one-digit number.

## Lesson 1 *Pupil's Book page 54*

### Preparation

You will need to have:

- Make a set of multiplication trail cards. These cards join together to make a trail, for example: Start card is placed, the answer to the first card is the number in the corner of the next card, the answer to the new multiplication is on the corner of another card. Make a set of about 20 cards per set.
- Pupil's Book

### Starter activity

Introduce the game *Multiplication Trails* to the class by handing out one card to each of 20 pupils. You could make a specific class set where there are sufficient cards for the number of pupils in the class. Play the start card and explain to the pupils how the game works, and who has the answer to whatever the equation on the start card is. The pupil with the answer comes and places the card next to the start card and asks who has the answer to the equation on his/her card. Complete the trail by using up all the cards. If someone has a card left over then a mistake must have been made somewhere along the trail.

### Lesson focus

Draw a multiplication square on the board as in the example in the Pupil's Book page 54, putting the numbers 1 to 9 across the top and the numbers 1 to 9 down the left-hand side. As a class, work out the answers to fill in the squares. The top left square is 1 × 1, the bottom right square is 9 × 9. Point to different squares on the board and make sure the pupils understand how a multiplication square works.

Once the square is completed, ask the pupils to use the square to find the answer to a few multiplication questions: 5 × 7; 9 × 3; 2 × 8, etc.

Guide pupils to trace the row that starts with the first number being multiplied, and the column that starts with the second number, and find the answer in the square where the row and column meet. Show them that the order does not matter, for example, 5 × 7 = 7 × 5. This is the commutative property of multiplication.

Complete Exercise 1 on page 54 in the Pupil's Book.

### Answers

**Exercise 1**

**1.** 8
**2.** 45
**3.** 56
**4.** 54
**5.** 16
**6.** 6
**7.** 8
**8.** 6
**9.** 18
**10.** 2
**11.** 7
**12.** 18

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to carry out given multiplications from 1 × 1 to 9 × 9 using the multiplication square at first, but they should become familiar with these multiplications and be able to do them mentally.

**Extension activity**

Pupils can complete the challenge on page 54 in the Pupil's Book. Ask them to work in pairs and test each other's recall of the multiplication tables from 1 – 9.

## Lesson 2 *Pupil's Book page 55*

### Preparation

You will need to have:

- Place-value equipment such as beads, counters, coins, etc.
- Pupil's Book

### Starter activity

Revise expanding two-digit and three-digit numbers. Write these numbers on the board and ask pupils to complete:

36 = 30 + 6
45 =
78 =
17 =
124 = 100 + 20 + 4
235 =
425 =
169 =

### Lesson focus

Use place-value equipment to make three groups of 18. Expand each group of 18 into 10 + 8. Record 10 + 8 + 10 + 8 + 10 + 8. Collect together all the tens and record 10 + 10 + 10. Collect together all the eights and record 8 + 8 + 8. Regroup the equipment to show three groups of 10 and three group of 8. Record on the board: 10 × 3 and 8 × 3.

Repeat the activity with four groups of 23. Allow the pupils to manipulate the equipment and talk their way through the partitioning into tens and ones and regrouping the tens and regrouping the ones into multiplications.

Now ask pupils if they can rewrite a multiplication equation using repeated addition, for example 14 × 2 (example on page 55 in the Pupil's Book). Point out to your pupils that repeated addition includes expanding into tens and units, as practised in the starter activity and with the place-value equipment. Show pupils how to set out their answers as on page 55. Give pupils a few more examples to practise using repeated addition.

Complete Exercises 2 and 3 on page 55 in the Pupil's Book.

### Answers

### Starter activity

45 = 40 + 5
78 = 70 + 8
17 = 10 + 7
235 = 200 + 30 + 5
425 = 400 + 20 + 5
169 = 100 + 60 + 9

**Exercise 2**

**2.** 15 × 2 = 2 groups of 15 = 15 + 15 =
10 + 5 + 10 + 5 =
20 + 10 = 30

**3.** 12 × 3 = 3 groups of 12 = 12 + 12 + 12 =
10 + 2 + 10 + 2 + 10 + 2 =
30 + 6 = 36

**4.** 22 × 2 = 2 groups of 22 = 22 + 22 =
20 + 2 + 20 + 2 =
40 + 4 = 44

### Exercise 3

**1.** 105
**2.** 96
**3.** 33
**4.** 40
**5.** 86
**6.** 55

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply two-digit numbers using repeated addition, including expanding numbers into tens and units as practised in the starter activity.

**Homework activity**
Pupils can complete Exercise 3 if they did not complete it in class.

**Support activity**
During the starter activity identify which pupils need extra help with expanding numbers into tens and units. Spend time with these pupils, revising place value and making sure that they can expand two-digit numbers into tens and units, using examples such as:
23 = 20 + 3;
18 = 10 + 8;
12 = 10 + 2

## Lesson 3 *Pupil's Book page 56*

### Preparation
You will need to have:
- Small 0 to 9 digit cards
- Pupil's Book

### Starter activity
*Multiplication Bingo*: Each pupil draws a 4 × 4 grid in their book. They choose which 16 numbers to write on their grid. Put two copies of each of the digits 0–9 into a bag, and draw out two cards and read the two numbers as a multiplication. For example, 3 and 4: call out 3 × 4. Any pupil with the number 12 on their card will cross off the number 12. Return the cards to the bag, and repeat. The winner is whoever has a complete row, horizontal, vertical or diagonal. If time permits or the winner could be the first completed grid.

### Lesson focus
Show pupils how the multiplication square used in Lesson 1 can be used to multiply a two-digit number by a one-digit number. To do this we write the sum out in columns as we did for addition and subtraction. For example when multiplying 43 by 2 we first multiply 3 by 2 to give us 6, and then we multiply 4 by 2 to give us 8. The final is thus 86. Emphasise that although we can multiply 4 by 2 for ease of calculation, we are in fact multiplying 40 by 2 to give us 80 in the tens column.

Work through a few more examples, including the example on page 56 in the Pupil's Book.

Complete Exercise 4 on page 56 in the Pupil's Book. Before asking pupils to start the exercise, demonstrate writing the first few questions in columns and ask pupils to use the multiplication square to complete the answers. They should continue to use the multiplication square for this exercise if they need to, but by the end of the exercise they should be able to work out the answers without having to rely on the multiplication square.

## Answers

**Exercise 4**

**1.** 99
**2.** 84
**3.** 88
**4.** 28
**5.** 39
**6.** 45
**7.** 48
**8.** 16
**9.** 55
**10.** 48
**11.** 99
**12.** 46

**Puzzle**

The boy on the right has the most counters – 48 is greater than 44

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply two-digit numbers by one-digit numbers using columns.

**Extension activity**

Pupils can complete the puzzle on page 56 in the Pupil's Book.

**Support activity**

Note which pupils are depending on the multiplication square for all multiplications, even simple ones, when multiplying in columns. These pupils may need extra practice with multiplying mentally to help them carry out these multiplication sums quicker. Give them an opportunity to learn their multiplication tables again and to test each other from memory.

# Lesson 4 *Pupil's Book page 57*

## Preparation

You will need to have:

- Multiplication cards
- Coloured chalks
- Pupil's Book

## Starter activity

Give a set of multiplication cards to each group of pupils. Place the cards face down on the table. Each person in the group takes turns to turn over two cards. If the two cards represent the same fact (any two cards out of a group of four) the player keeps the cards and has another turn. If the cards do not match, they turn the cards back over and play moves on to the next player.

## Lesson focus

This lesson extends the work done in the previous lesson to including multiplying with renaming. The questions in the previous lesson all involved multiplying two-digit numbers by one-digit numbers to give an answer which is a two-digit number. Explain to pupils that sometimes the answer is a three-digit number, which means we need to add a hundreds column to our calculation. Remind pupils of the way in which we carried and renamed numbers when adding in columns – we use the same principle when multiplying in columns.

Work through the example on page 57 in the Pupil's Book, explaining that we cannot have 72 tens so we write the 2 in the tens column and the 7 in the hundreds column. Work through a few other examples such as: 82 × 4 =; 67 × 3 =; 58 × 8 =.

Use coloured chalks to distinguish between the hundreds, tens and units columns.

Complete Exercises 5 and 6 on page 57 in the Pupil's Book.

## Answers

**Exercise 5**

**1.** 364
**2.** 166
**3.** 204
**4.** 105
**5.** 396
**6.** 396

**Exercise 6**

**1.** 56 × 6 = 336
**2.** 14 × 8 = 112
**3.** 13 × 5 = 65
**4.** 19 × 4 = 76
**5.** 43 × 7 = 301

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply two-digit numbers with renaming.

**Homework activity**

Pupils can complete Exercise 6 on page 57 in the Pupil's Book for homework if they have not completed it in class.

**Support activity**

Note which pupils need extra support and pair them up with pupils who have grasped multiplication with renaming quickly. Let them work together to carry out a few multiplication questions.

# Revision lesson for Unit 14

*Pupil's Book Pages 54–57; Workbook page 24*

## Preparation

You will need to have:

- Workbook
- Pupil's Book

## Lesson focus

Revise the work covered in Unit 14:

- Multiply given numbers from 1 × 1 to 9 × 9.
- Multiply two-digit numbers by one-digit numbers using the three methods covered in the unit.

Remind pupils of the key word definitions for this unit:

- *multiply:* to add a number to itself a certain number of times
- *product*: when we multiply two numbers together the answer is called the product
- *multiplication:* the process of multiplying
- *repeated addition:* to add a number to itself over and over

Compelete Worksheet 14 (Workbook page 24).

## Answers

**Worksheet 14**

**1.** **a)** 15
**b)** 32
**c)** 48
**d)** 32
**2.** **a)** 12
**b)** 2
**c)** 3
**d)** 3
**3.** **a)** 12
**b)** 90
**c)** 212
**4.** **a)** 129
**b)** 186
**c)** 108
**5.** **a)** 69
**b)** 252
**c)** 658

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to carry out given multiplications from 1 × 1 to 9 × 9 and multiply two-digit numbers by one-digit numbers.

# Unit 15 Multiplying three one-digit numbers

**Objectives**

By the end of this unit, pupils will be able to:

- Multiply three one-digit numbers taking two at a time.

## Suggested resources

You will need to have:

- Small 0 to 9 digit cards
- Multiplication cards
- Decks of cards
- Pupil's Book
- Workbook

## Key word definitions

*brackets:* we use brackets to group numbers in order to show which numbers to multiply first
*horizontal:* going from side-to-side, like the horizon
*horizontally:* working across the page
*vertical:* going up and down

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should have recall of multiplication facts. Pupils should be able to add two given one-digit numbers, from 1 × 1 to 9 × 9.

## Common errors pupils make

Pupils may have memorised the result of multiplication equations without understanding the concepts of multiplication. Multiplication is repeated addition. Pupils who continue to experience difficulties with the concept of multiplication will need close monitoring and support in learning the concepts, not just in memorising the multiplication tables.

## Evaluation guide

Assess whether pupils can:

- Multiply three given one-digit numbers taking two at a time.

## Lesson 1 *Pupil's Book page 58*

### Preparation

You will need to have:

- Small 0 to 9 digit cards
- Pupil's Book

### Starter activity

Play *Multiplication Bingo* as in Unit 14.

### Lesson focus

Look together at the example on page 58 in the Pupil's Book, which models multiplying 6 × 3 × 4. Explain that the brackets are simply used to show which part you are working out first.

Ask the pupils if the order in which they do the calculation matters. Model the example again but this time in the order 4 × 3 × 6, to demonstrate the associative property of multiplication – the way in which we group the numbers being multiplied does not affect the answer.

It is useful to be able to do multiplications in a different order because some of the tables facts are easier to remember than others.

Complete Exercise 1 (Pupil's Book page 58). Remind pupils to use brackets to show which two numbers they will multiply first. Ask them to not always start with the first two numbers. Once pupils have completed the exercise, ask them to redo it starting with two different numbers than they did the first time – they should get the same answers both times.

### Answers

**Exercise 1**

**1.** 24
**2.** 48
**3.** 96
**4.** 32
**5.** 60
**6.** 32

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply three one-digit numbers taking two at a time. Pupils should demonstrate an understanding of the associative property of multiplication when three numbers are being multiplied.

**Extension activity**

Repeat the starter activity, but this time have three copies of each digit in the bag, and draw out three digits each time.

**Support activity**

Have a times tables quiz to give pupils extra practice at multiplying one-digit numbers.

## Lesson 2 *Pupil's Book page 59*

### Preparation

You will need to have:

- Small 0 to 9 digit cards
- Pupil's Book

### Starter activity

Play the extension activity from the previous lesson, using three single-digit cards.

### Lesson focus

In this lesson we will carry out multiplication of three one-digit numbers again, but this time working vertically or down the page, instead of horizontally as in the previous lesson. Remind pupils of the column method used in Unit 14, and explain that we can use the same method when multiplying more than two numbers. The brackets show us which two numbers to multiply first.

Work through the example on page 59 in the Pupil's Book, pointing out how renaming is being used as in the previous unit. We multiply 3 and 4 to give us 12, and then we rename 12 as 2 units and 1 ten.

Do the example again this time as (6 × 3) × 4 to show that the way in which we group the numbers does not affect the answer (the associative property of multiplication).

Complete Exercise 2 on page 59 in the Pupil's Book, asking pupils to first rewrite each question using brackets to show which two numbers they are going to multiply first. If time allows, ask them to redo the exercise starting with a different grouping of numbers to illustrate the associative property of multiplication.

### Answers

**Exercise 2**

**1.** 30
**2.** 105
**3.** 128
**4.** 50
**5.** 96
**6.** 8
**7.** 64
**8.** 84
**9.** 24
**10.** 280
**11.** 42
**12.** 80

**Extension**

**1.** 240
**2.** 840

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply three one-digit numbers taking two at a time using columns. They should demonstrate an understanding of the associative property of multiplication – the way in which numbers are grouped when multiplying three numbers does not affect the answer.

**Extension activity**

Ask pupils to multiply four one-digit numbers using the vertical/column method:

**1.** 3 × 5 × 8 × 2 =
**2.** 4 × 5 × 6 × 7 =

Encourage them to explore whether the answer will be the same if they group the numbers in different ways – does the associative property apply when we are multiplying four one-digit numbers? They should notice that the answer will be the same regardless of the way in which the numbers are grouped.

## Lesson 3 *Pupil's Book page 60*

### Preparation

You will need to have:

- Multiplication cards
- Pupil's Book

### Starter activity

Give pupils a set of multiplication trail cards to complete.

### Lesson focus

Read through each question from Exercise 4 (Pupil's Book page 60) as a class and discuss what the question is asking. Ask pupils which three numbers they need to multiply together, and in which order they should multiply them. They should be able to explain to you that the order in which you multiply the three numbers does not matter. Encourage the pupils to visualise the problem, and then write the multiplication equation using brackets to show which two numbers they will multiply first.

It is important that they realise that they can choose whichever method they find most helpful. It may be necessary to remind pupils of the work done in the unit on multiplying three one-digit numbers horizontally and vertically.

Complete Exercises 3 and 4 (Pupil's Book page 60).

### Answers

**Exercise 3**

**1.** 2
**2.** 3
**3.** 2
**4.** 3
**5.** 4
**6.** 5

**Exercise 4**

**1.** 96
**2.** 96
**3.** 40

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to use the two methods taught in this unit to multiply three one-digit numbers, two at a time. They should be able to find the answers to multiplication word stories.

**Extension activity**

Pupils can complete the puzzle on page 60 of the Pupil's Book.

**Support activity**

Spend time individually helping pupils who struggle to write a multiplication sum using a word story. Read the story carefully with them and help them to see which numbers are being multiplied, and then to carry out the multiplication. Now ask pupils to pick any three one-digit numbers and then to make up a word story linking those numbers by multiplication.

## Lesson 4 *Pupil's Book page 61*

### Preparation

You will need to have:

- Decks of cards
- Pupil's Book

### Starter activity

Play *Flip-Up*: This game is played by three pupils with a deck of cards with the jokers and face cards removed. Pupils shuffle the deck and deal them all out face down. Each player flips over a card from his or her pile. The first player to call out the correct product of the three numbers gets to collect the three flipped over cards. If a player calls out the wrong answer the pupil who corrects the first player gets the cards. Players continue until all the cards have been flipped over. The winner is the player with the most cards at the end.

### Lesson focus

Read the instructions of Exercise 5 on page 61 in the Pupil's Book. Guide your pupils to find answers to the multiplication sums and solve the code. Do two or three sums with the class then let them work alone or in pairs, using either the horizontal or vertical method for multiplying three numbers, taking two at a time. Give help where needed. Finally, let them read the coded message out.

Complete Exercise 5 page 61 in the Pupil's Book.

### Answers

**Exercise 5**

**2.** 18 = E
**3.** 12 = A
**4.** 48 = R
**5.** 40 = N
**6.** 24 = F
**7.** 42 = O
**8.** 56 = U
**9.** 48 = R
**10.** 54 = T
**11.** 12 = A
**12.** 16 = B
**13.** 36 = L
**14.** 18 = E
**15.** 81 = S

The coded message is: Learn four tables.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to multiply three one-digit numbers taking two at a time.

**Extension activity**

Have pupils complete the challenge on page 61 in the Pupil's Book, working in pairs.

## Revision lesson for Unit 15

*Pupil's Book pages 58–61; Workbook page 25*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 15:

- Multiplying three one-digit numbers taking two at a time.

Remind pupils of the key word definitions for this unit:

- *brackets*: we use brackets to group numbers in order to show which numbers to multiply first
- *horizontal*: going from side-to-side, like the horizon
- *horizontally:* working across the page
- *vertical*: going up and down

Complete Worksheet 15 (Workbook page 25).

### Answers

**Worksheet 15**

**1.** **a)** 24
**b)** 10
**c)** 18
**d)** 32

**2.** **a)** 24
**b)** 60
**c)** 72
**d)** 24
**e)** 50
**f)** 210

**3.** **a)** 4
**b)** 5
**c)** 2
**d)** 2
**e)** 2
**f)** 2

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to multiply three one-digit numbers taking two at a time. They should understand that they can start with any two of the three numbers and the final answer will be the same.

# Unit 16 Dividing whole numbers without remainder

**Objectives**

By the end of this unit, pupils will be able to:

- Divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 without remainder.

## Suggested resources

You will need to have:

- Counters such as beads, buttons, coins, pebbles, etc.
- Multiplication memory cards
- Pupil's Book
- Workbook

## Key word definitions

*remainder:* the amount left over after division
*divide:* when we divide numbers we are sharing or splitting them into equal parts or groups
*division:* the process of splitting into equal parts or group
*repeated subtraction:* subtracting the same number a certain number of times

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should have recall of multiplication facts. Pupils should be able to add and subtract two-digit numbers. Pupils should have a good understanding of place value. Pupils should understand the importance of 10. Pupils should know the number of tens in hundreds.

## Common errors pupils make

Errors occur where pupils do not have a firm foundation of prior knowledge. Pupils who do not have fairly good instant recall of their multiplication tables will struggle with division because division requires pupils to be able recall the factors which make a number.

## Evaluation guide

Assess whether pupils can:

- Divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 without remainder by grouping and repeated subtraction.

## Lesson 1 *Pupil's Book page 62*

### Preparation

You will need to have:

- Small items as counters
- Pupil's Book

### Starter activity

Draw two circles on the board and divide each circle into quarters. In one circle, write one of the following numbers in each quarter: 2, 3, 6, 7. In the other circle write the numbers 4, 5, 8, 9. Explain to the pupils that they need to pick one number from each circle and multiply them together. Ask how many different results they can get. Pupils should then write the equations down in their books.

### Lesson focus

Show the class a handful of 15 pencils, and ask: If I shared these pencils between five pupils, how many would they have each? Record on the board:
15 shared between 5 = 15 ÷ 5 =

Physically share the pencils between five pupils, sharing one by one. Complete the recorded equation on the board: 15 ÷ 5 = 3. Look at the five pupils each holding three pencils and ask: Is there a multiplication here? We have five groups of three.
3 × 5 = 15

Read together through the example in the Pupil's Book on page 62.

Complete Exercise 1 (Pupil's Book page 62). If required, allow pupils to use 24 small items to physically complete the sharing and record the division and the multiplication equation.

For Exercise 2, The pupils to divide each number by the number to its immediate right.

### Answers

**Exercise 1**

**1.** 8
**2.** 6
**3.** 4
**4.** 3
**5.** 2

**Exercise 2**

**1.** 12 ÷ 3 = 4
**2.** 8 ÷ 4 = 2
**3.** 16 ÷ 2 = 8
**4.** 20 ÷ 5 = 4
**5.** 36 ÷ 9 = 4

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6. Pupils should be able to understand division as sharing. Pupils should be able to use sharing or multiplication knowledge to complete division questions.

**Homework activity**

Pupils can complete Exercise 2 for homework if they did not complete it in class.

**Support activity**

Spend more time using familiar items, such as beads, sweets, coins, etc. to demonstrate division by sharing and let pupils work in small groups with counters until they are able to carry out division by sharing without having to depend on physical items. Show them how they can also draw diagrams to help them carry out division by sharing, for example drawing 12 dots in order to work out how to share 12 items among three pupils.

## Lesson 2 *Pupil's Book page 63*

### Preparation

You will need to have:

- Counters
- Pupil's Book

### Starter activity

On the board, write the following numbers at random within a circle or box: 2, 3, 4, 6, 8, 12, 24, 32, 16, 48.

Ask the pupils to select three numbers which are related by division: 32 ÷ 4 = 8 or 48 ÷ 6 = 8. Record on the board all the different equations the pupils come up with.

### Lesson focus

Revise the method covered in the previous lesson and ask pupils to complete Exercise 3 on page 63 in the Pupil's Book. They can use counters but as division becomes more familiar they should be able to work out the answers without having to use counters.

Explain to the pupils that in order to carry out division with larger numbers we can also reorganise the tens and ones in a number to make sure that we have a number of tens that we can share without having any left over.

For example: 42 ÷ 3 =. If we shared four tens between three pupils we would have ten left over so reorganise the number. Having just three tens would be good. We can use the 42 as 30 + 12. 30 ÷ 3 = 10 and 12 ÷ 3 = 4, so 42 ÷ 4 = 14.

Complete Exercise 4 in the Pupil's Book on page 63. If necessary read through the problems first to make sure that pupils understand how to write down the correct division equations to solve. Let pupils use counters to help them solve the problems if they need to.

### Answers

**Exercise 3**

**1.** 6
**2.** 7
**3.** 4
**4.** 6
**5.** 4
**6.** 6
**7.** 7
**8.** 7
**9.** 2

**Exercise 4**

**1.** 7
**2.** 3
**3.** 8
**4.** 6

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve division word stories, at first using counters but later without the use of counters.

**Extension activity**

Ask pupils to write a division word story, using whole numbers not greater than 48. They can exchange word stories with a partner and work out the answers to each other's word stories.

**Support activity**

Pair pupils up and ask one pupil to explain to the other how to solve a given word story using division. They can then exchange roles so that the first pupil now listens and the second explains. Walk around and supervise the process, guiding pupils who are explaining and pupils who are listening.

## Lesson 3 *Pupil's Book page 64*

### Preparation

You will need to have:

- Counters
- Pupil's Book

### Starter activity

Play *Target 80*. Pupils draw two columns in their book. Take a set of 0 to 9 digit cards. Draw four cards from the bag, one at a time, the pupils have to decide whether they will place the digit in the tens column or the ones column. They must write the number before you draw another card. When the two-digit numbers are added together, the total should be as close to 80 as they can make it. This activity is focusing the pupils back on tens and ones as they need to be expanding numbers again for division.

### Lesson focus

Ask pupils to define multiplication – they should be able to tell you that it involves repeated addition. Now explain that division involves repeated subtraction, and that another way to divide is to keep subtracting until we reach 0. Split pupils into small groups and hand each group 20 counters. Ask them to remove 5 counters from the pile, and ask them how many counters are left (15). Now tell them to keep removing 5 counters until there are no counters left. Ask them how many times they removed 5 counters – the answer is 4 times. Write it out on the board as follows:
20 – 5 = 15
15 – 5 = 10
10 – 5 = 5
5 – 5 = 0.

We removed 5 four times, so 20 ÷ 5 = 4.

Now work through the example on page 64 in the Pupil's Book, drawing the balls on the board and crossing 3 off each time you subtract. Guide the pupils to see that this subtraction is done three times before zero is reached, thus the answer is 3.

Do similar sums on the board, asking the pupils how many times you subtracted for each sum.

Complete Exercises 5 and 6 on page 64 in the Pupil's Book.

### Answers

**Exercise 5**

**1.** 15 ÷ 5 = 3
**2.** 48 ÷ 8 = 6
**3.** 36 ÷ 9 = 4
**4.** 30 ÷ 6 = 5

**Exercise 6**

**1.** 6
**2.** 9
**3.** 4
**4.** 12
**5.** 12
**6.** 24

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to write a division equation based on repeated subtraction, and divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 using repeated subtraction.

**Extension activity**

Make sure pupils are regularly practising their multiplication and division tables through playing games and testing each other in pairs. Have a short multiplication and division quiz to end the lesson.

## Lesson 4 *Pupil's Book page 65*

### Preparation

You will need to have:

- Large number line drawn on the board
- Pupil's Book

### Starter activity

On the board write the following numbers at random within a circle or box: 2, 3, 4, 6, 8, 12, 24, 32, 16, 48. Ask the pupils to select three numbers which are related by multiplication or division, for example: 2 × 8 = 16 or 32 ÷ 4 = 8. Record on the board all the different equations the pupils come up with.

### Lesson focus

Draw a large number line on the board, ranging from 0 to 24. Use the number line to work through the examples: 24 ÷ 3 = ; 18 ÷ 3 = ; 20 ÷ 4 = .

Guide pupils to see that division is also counting in groups. Lead them to count in groups using the number line and say how many jumps or groups they have. Each time, ask a pupil to come up to the board and, starting from 0, to demonstrate to the class how many jumps they make. For example, when dividing 24 by 3, ask pupils how many jumps it takes to reach 24 when counting in threes (eight jumps).

Now work through the examples on page 65 in the Pupil's Book, where necessary using a number line on the board.

Complete Exercise 7 and 8 on page 66 in the Pupil's Book. Help pupils to use the examples on page 65 to write out the exercise questions, then work out the answers on their own.

### Answers

**Exercise 7**

**1.** 2
**2.** 2
**3.** 1
**4.** 1
**5.** 7
**6.** 7
**7.** 9
**8.** 5
**9.** 24

**Exercise 8**

**1.** 12 ÷ 3 = 4
**2.** 16 ÷ 8 = 2
**3.** 24 ÷ 4 = 6
**4.** 18 ÷ 6 = 3
**5.** 20 ÷ 5 = 4

**Puzzle**

1

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to divide using a number line. They should recognise that division is also counting in groups.

**Extension activity**

Complete the puzzle on page 66 in the Pupil's Book.

**Support activity**

Some pupils may struggle to use the number line for division. Show these pupils that there are other ways to carry out division by counting in groups, such as using small items and grouping them, for example to divide 16 by 2, we form two groups of 8. Practise a few questions like this using grouping and then return to the number line to show pupils that we are simply using the number line to illustrate the same process of division by grouping.

## Lesson 5 *Pupil's Book page 67*

### Preparation

You will need to have:

- Multiplication memory cards
- Pupil's Book

### Starter activity

Use multiplication memory cards but place the cards with the answer to the multiplication showing. Pupils select a card and give the possible multiplications that could be on the other side. For example, the card showing 15 could have 3 × 5 or 5 × 3 on the reverse. If pupils have stated or recorded the multiplication they keep the card. Collect as many cards as they can.

### Lesson focus

Explain to the pupils that you have a machine that can multiply numbers by whatever number is written on the machine. Place a chair, in front of the class with the number five written on it. Show the card with a three written on it and ask: If I put this card into the machine what number will come out of the machine? Act out the situation with a pupil sitting on the chair with a set of cards showing the multiples of five on them (being the machine), and give them the card with a three on it and the pupil finds the card 15 and passes it out to another pupil.

Ask the question: If we made the machine work backwards, and we put the 15 card back into the machine, what would the machine have to do to number 15 to get the number 3 back? The machine must divide 15 by 5. Emphasise that multiplication and division are opposite operations.

Practise with some more numbers, going forwards by multiplying and backwards by dividing.

Show pupils how to draw a triangle to illustrate the relationship between multiplication and division, as in the example on page 67 in the Pupil's Book, and to write division and multiplication sentences.

Complete Exercise 9 on page 67 in the Pupil's Book.

### Answers

**Exercise 9**

**1.** 6 × 3 = 18
3 × 6 = 18
18 ÷ 3 = 6
18 ÷ 6 = 3

**2.** 4 × 3 = 12
3 × 4 = 12
12 ÷ 3 = 4
12 ÷ 4 = 3

**3.** 6 × 4 =24
4 × 6 = 24
24 ÷ 6 = 4
24 ÷ 4 = 6

**4.** 4 × 5 = 20
5 × 4 = 20
20 ÷ 5 = 4
20 ÷ 4 = 5

**5.** 6 × 2 = 12
2 × 6 = 12
12 ÷ 2 = 6
12 ÷ 6 = 2

**6.** 2 × 5 = 10
5 × 2 = 10
10 ÷ 2 = 5
10 ÷ 5 = 2

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to recognise that division is the opposite of multiplication and write division and multiplication sentences.

**Extension activity**

Complete the challenge on page 67 in the Pupil's Book.

**Support activity**

Extra practice writing division and multiplication sentences, giving pupils three numbers at a time:
21, 7 and 3; 4, 5 and 20; 8, 2 and 16.

## Revision lesson for Unit 16

*Pupil's Book pages 62–67; Workbook page 26*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 16:
- Divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 without remainder.

Remind pupils of the key word definitions for this unit:
- *remainder:* the amount left over after division
- *divide:* when we divide numbers we are sharing or splitting them into equal parts or groups
- *division:* the process of splitting into equal parts or group
- *repeated subtraction:* subtracting the same number a certain number of times

Complete Worksheet 16 (Workbook page 26).

### Answers

**Worksheet 16**

**1.** **b)** 7
**c)** 3
**d)** 5
**e)** 5

**2.** **a)** 5
**b)** 6
**c)** 7
**d)** 3
**e)** 6
**f)** 6

**3.** **a)** 1
**b)** 6
**c)** 6
**d)** 3
**e)** 5
**f)** 7

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to divide whole numbers not exceeding 48 by 2, 3, 4, 5 and 6 without remainder using the methods taught in this unit.

# Unit 17 Factors and multiples

**Objectives**

By the end of this unit, pupils will be able to:

- Express given whole numbers not exceeding 48 as products of their factors.
- Find a missing factor in a given number.
- Distinguish between factors and multiples.

## Suggested resources

You will need to have:

- Small items to use as counters
- Small number cards
- Multiplication wall chart
- Pupil's Book
- Workbook

## Key word definitions

*factor:* a number that will divide into it without any remainder

*multiple:* a number that will divide into another number with no remainder

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Factors and multiples build on knowledge of multiplication and division, thus pupils need to have an understanding of these concepts and be able to multiply and divide whole numbers either from memory or using the strategies taught in previous units.

## Common errors pupils make

Pupils may have memorised multiplication and division tables without understanding the concepts of multiplication. Multiplication is repeated addition, and division is repeated subtraction. This unit is designed to be an extension of multiplication and division concepts to include factors and multiples. Pupils who continue to experience difficulties with these concepts will need close monitoring and support in learning the concepts, not just in memorising the multiplication and division tables.

## Evaluation guide

Assess whether pupils can:

- Express given whole numbers not exceeding 48 as products of their factors.
- Construct rectangular pattern of numbers and use same to find factors of given numbers.
- Find a missing factor in a given number.
- Distinguish between factors and multiples of given numbers.

## Lesson 1 *Pupil's Book page 68*

### Preparation

You will need to have:

- Small items to use as counters
- Pupil's Book

### Starter activity

On the board write the following numbers at random within a circle or box: 2, 3, 5, 6, 7, 10, 12, 14, 15, 18, 21, 30, 35, 42. Ask the pupils to select three numbers which are related by multiplication or division, for example: 5 × 6 = 30 or 15 ÷ 3 = 5. Record on the board all the different equations the pupils come up with.

### Lesson focus

Refer pupils back to the starter activity and explain the three numbers they choose are always two factors and a multiple. The numbers they multiply together are the factors of the third number which is the multiple.

2 × 3 = 6. Which numbers are the factors and which number is the multiple? (2 and 3 are factors, and 6 is the multiple.)

3 × 6 = 18. Which numbers are the factors and which number is the multiple? (3 and 6 are factors, and 18 is the multiple.)

Can the number 18 have any other factors other than 3 and 6? Is there another multiplication that will make 18?

2 × 9 = 18 (2 and 9 are also factors of 18)

1 × 18 = 18 (1 and 18 are also factors of 18)

The number 18 has six factors: 1, 2, 3, 6, 9, 18.

Now show your pupils how to use the multiplication square to find the factors of 18, as in the example on page 68 in the Pupil's Book. Repeat using other numbers, such as 15, 21 and 36.

Complete Exercise 1 on page 69 in the Pupil's Book. Use questions 5 to 8 to identify factors.

### Answers

**Exercise 1**

**1.** 6
**2.** 7
**3.** 4
**4.** 4
**5.** 9; 6
**6.** 10; 4
**7.** 12; 8; 6
**8.** 9; 15; 5

**Puzzle**

1 bag of 36; 2 bags of 18; 3 bags of 12; 4 bags of 9; 6 bags of 6; 9 bags of 4; 12 bags of 3; 18 bags of 2; 36 bags of 1.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to find a missing factor of a given number. Encourage pupils may need to use the multiplication square initially, but eventually they should be able to do so without using the square.

**Extension activity**

Complete the puzzle on page 69 in the Pupil's Book.

**Support activity**

Finding factors depends on division. Those pupils who struggle to find a missing factor of a given number may need extra practice with division. Spend time revising division with them and giving them a few questions to complete.

## Lesson 2 *Pupil's Book page 69; Workbook page 27*

### Preparation

You will need to have:

- Small number cards containing two sets of numbers 1 to 9
- Pupil's Book

### Starter activity

Ask the pupils to draw a grid in their book, four by four squares. Explain that you will be calling out pairs of factors to be multiplied together from one to nine. Into each of the squares they choose a number to write (obviously, it should be a multiple from 1 × 1 up to 9 × 9). Check that pupils have not chosen any numbers outside the tables such as 17 or 22, etc. Have a bag with two sets of numbers one to nine and select two numbers and call the equation, for example 4 × 5. Anyone with 20 on their grid can cross off the 20. First person to complete a line, vertical, horizontal or diagonal is the winner. If time permits, the winner could be the first to complete their grid.

### Lesson focus

Remind pupils of the definition of a factor, and the method used to find factors in the previous lesson. Draw a multiplication square on the board and remind pupils how to find two numbers from the square to give a certain number – these two numbers are factors of the bigger number. Find as many such pairs as possible and list them to show the factors of a certain number. Ask a few pupils to come up to the board and use the multiplication square to find the factors of a few numbers (such as 12 and 16). Then erase the square and ask pupils to list the factors of a few more numbers without using the multiplication square (such as 9, 15 and 20).

Complete Exercises 2 and 3 on page 69 in the Pupil's Book.

### Answers

**Exercise 2**

**1.** Any two of: 1; 2; 4; 8.
**2.** Any three of: 1; 3; 5 and 15.
**3.** Any two of: 1; 2; 4; 5; 8; 10; 20; 40.
**4.** Any three of: 1; 2; 3; 6; 9; 18.

**Exercise 3**

**1.** 1; 2; 3; 6
**2.** 1; 3
**3.** 1; 5
**4.** 1; 2; 4; 8
**5.** 1; 2; 5; 10
**6.** 1; 2; 7; 14
**7.** 1; 2; 4; 8; 16; 32
**8.** 1; 2; 4; 5; 8; 10; 20; 40
**9.** 1; 2; 3; 4; 6; 8; 12; 16; 24; 48

**Worksheet 17**

**1.** The factor of a number is the number that will divide into the number without any remainder.
**2.** **b)** 1, 2, 3, 5, 6, 10, 15, 30
**c)** 1, 2, 4, 7, 14, 28
**d)** 1, 2, 4, 8, 16, 32

**Extension**

**1.** 4
**2.** 2
**3.** 6

**Assessment**

Observe the numbers that pupils place on their grids in the starter activity. Do they select numbers that are possible multiples or are they selecting any number? Discuss with the pupils which numbers could come up, which numbers could come up more than once and which numbers would never get crossed out. (Prime numbers more than 9.) Observe and listen to the pupils during the rest of the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to express given whole numbers not exceeding 48 as products of their factors.

**Homework activity**
Worksheet 17, questions 1 and 2 (Workbook page 27). Answers above.

**Extension activity**
Ask pupils to find the biggest factor which these numbers share:
**1.** 12 and 16
**2.** 6 and 8
**3.** 12 and 18

## Lesson 3 *Pupil's Book page 70*

### Preparation

You will need to have:
- Multiplication wall chart
- Counters
- Pupil's Book

### Starter activity

Play *Multiplication Bingo*: Each pupil draws a 4 × 4 grid in their book. They choose which 16 numbers to write on their grid. Put two copies of each of the digits 0 to 9 into a bag, and draw out two cards and read the two numbers as a multiplication. For example, 3 and 4: call out 3 × 4. Any pupil with number 12 on their card will cross off the number 12. Return the cards to the bag, and repeat. The winner is whoever has a complete row, horizontal, vertical or diagonal. If time permits, the winner could be the first completed grid.

### Lesson focus

Explain to the pupils the meaning of a multiple. Draw a number line on the board, ranging from 0 to 25, and show pupils how to use it to arrive at multiples of a number by skip counting. Demonstrate one example (the example on page 70 in the Pupil's Book) and then call pupils up to the board to use the number line to find multiples of 3, 4 and 5.

Also show pupils how to use the multiplication square wall chart to determine multiples.

Complete Exercise 4 (Pupil's Book page 70) and Exercise 5 (Pupil's Book page 71). Help your pupils to correctly interpret the problems in Exercise 5.

### Answers

**Exercise 4**

**1.** 6, 12, 18
**2.** 3, 6, 9
**3.** 4, 8, 12
**4.** 5, 10, 15
**5.** 2, 4, 6
**6.** 7, 14, 21
**7.** 8, 16, 24
**8.** 9, 18, 27
**9.** 10, 20, 30

**Exercise 5**

**1.** 4, 8, 12, 16, 20
**2.** 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
**3.** 48
**4.** 24
**5.** 20
**6.** Mary's plant will take 3 weeks and Dayo's plant will take 4 weeks.
**7.** 1, 2, 3, 6, 9, 18
**8.** 1, 2, 3, 4, 6, 8, 12, 24
**9.** 1, 2, 3, 6

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to list the multiples of a given number.

**Extension activity**

Use a set of memory cards with the multiples face up. Find all the cards with the same multiple (i.e. all the factors of 24). Before turning them over write a list of all the factors of 24. Turn the cards over and check that only the numbers you have written down appear in the multiplications written on the reverse side.

**Support activity**

Pupils who struggle to find multiples may need extra practice counting in intervals. Ask them to count in 2s, 3s, 4s and 5s, and then show them that all they are doing is listing the multiples of these numbers.

## Revision lesson for Unit 17

*Pupil's Book pages 68–71; Workbook page 27*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 17:

- Expressing given whole numbers not exceeding 48 as products of their factors.
- Finding a missing factor in a given number.
- Distinguishing between factors and multiples.

Remind pupils of the key word definitions for this unit:

- *factor:* a number that will divide into it without any remainder
- *multiple*: a number that will divide into another number with no remainder

Complete Worksheet 17 questions 3 to 5 (Workbook page 28 and 29).

### Answers

**Worksheet 17**

**3.** **b)** 25 = 5 × 5 = 25 × 1
**c)** 18 = 1 × 18 = 2 × 9 = 3 × 6
**d)** 48 = 1 × 48 = 2 × 24 = 3 × 16 = 4 × 12 = 6 × 8
**e)** 64 = 1 × 64 = 2 × 32 = 4 × 16 = 8 × 8
**4.** A multiple is number that will divide into another number with no remainder.
**5.** **b)** 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
**c)** 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30
**d)** 8, 16, 24
**e)** 6, 12, 18, 24, 30, 36, 42, 48
**f)** 7, 14, 21, 28

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to express given whole numbers not exceeding 48 as products of their factors, find a missing factor in a given number, list the multiples of a given number, and distinguish between factors and multiples.

# Unit 18 Open sentences

**Objectives**

By the end of this unit, pupils will be able to:
- Find a missing number in an open sentence.
- Identify the relationship between addition and subtraction.
- Solve related quantitative aptitude problems.

## Suggested resources

You will need to have:
- Large number line
- Pupil's Book
- Workbook

## Key word definitions

*open number sentence*: a sum that has a digit missing. It will become true or false depending on the value we fill in.
*formula*: a rule or equation that shows how to work something out

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils should know and use addition and subtraction facts to 20. They should have an understanding of the meaning of an equals sign.

## Common errors pupils make

Pupils may make computational mistakes with adding and subtracting. They may also get confused when deciding whether to add or subtract in order to find the missing number in an open number sentence. Some pupils may also have misconceptions regarding the equal sign in an equation. Look out for this and make sure that they are using equal signs correctly.

## Evaluation guide

Assess whether pupils can:
- Solve given problems on open sentences.
- Find missing numbers on quantitative aptitude diagrams.

## Lesson 1 *Pupil's Book page 72*

### Preparation

You will need to have:
- Large number line
- Pupil's Book

### Starter activity

Draw a number line on the floor or playground. Mark on the numbers 0 to 20. Choose a pupil to stand on number five. Ask him/her to step forward four steps. The pupil stepping counts the numbers on the number line six, seven, eight and nine; the rest of the class count the steps one, two, three and four. Choose another pupil and a different starting number and number to step forwards or backwards. Ask the class to predict where the stepping pupil will finish. You could keep a record of each question as an addition or subtraction equation on the board.

### Lesson focus

Use a wall number line and circle the numbers 8 and 15.
Ask the pupils: How many steps will it take to get from 8 to 15? (7 steps)
Ask: How many steps will it take to get from 15 to 8? (7 steps)
Ask: Where will you end up if you start at zero and take 8 steps and then 7 steps? (15)

Write these four equations on the board:

| | |
|---|---|
| 8 + 7 = 15 | 15 – 8 = 7 |
| 7 + 8 = 15 | 15 – 7 = 8 |

Now write an open number sentence on the board, such as: 6 + ? = 17. Ask pupils to use the number line to work out the missing number. Repeat with a few other number sentences:
14 – ? = 9
8 + ? = 11

Ask pupils complete Exercise 1 on page 72 in the Pupil's Book by drawing a number line in their books and using it to answer the questions.

### Answers

**Exercise 1**

**1.** 2
**2.** 8
**3.** 3
**4.** 7
**5.** 2
**6.** 2

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve given problems on open number sentences using a number line.

**Extension activity**

Complete the question asked by the pupil in the picture on page 72 in the Pupil's Book, without using a number line if possible (the number is 111).

**Support activity**

Have practice lists of twenty addition and subtraction equations for the pupils to complete. Practising orally with a partner will also give practise in instant recall of addition and subtraction facts to twenty.

## Lesson 2 *Pupil's Book page 72*

### Preparation

You will need to have:

- Large number line
- Pupil's Book

### Starter activity

Write the numbers 45, 20 and 75 on the board. Ask pupils to put these numbers into a number sentence using addition and/or subtraction to make a number as close to 100 as they can. Ask one child to demonstrate their answer. The solution should be: 75 + 45 – 20 = 100
(75 + 45 = 120, 120 – 20 = 100).

Write the numbers 10, 30 and 85 on the board and ask pupils to repeat the task using these numbers. Can you make 100 exactly? How close can you get? Ask one pupil to show their working. The best solution should be: 85 + 30 – 10 = 105. What is the difference between 105 and 100? (5.)

### Lesson focus

Show pupils how to complete an open number sentence by using the opposite operation. Addition and subtraction are opposite operations, so if we are looking for the missing number in an addition sum we need to subtract. If we are looking for the missing answer in a subtraction sum, we can either add or subtract – work through these three examples: ? + 4 = 19; ? – 8 = 7; 24 – ? = 9

Explain that although the last two examples both involve subtraction, to find the missing number we add in the first one and subtract in the second. Make sure pupils can see why this is the case.

Work through the examples on pages 72 and 73 in the Pupil's Book.

Complete Exercises 2 and 3 on page 73 in the Pupil's Book. Make sure pupils are first rewriting the addition or subtraction sums as asked, and not just writing down the answer.

### Answers

**Exercise 2**

**1.** 8 – 5 = 3
**2.** 38 – 12 = 26
**3.** 78 – 46 = 32
**4.** 112 – 67 = 45
**5.** 49 – 17 = 32
**6.** 109 – 82 = 27

**Exercise 3**

**1.** 20 + 12 = 32
**2.** 32 + 8 = 40
**3.** 46 – 16 = 30
**4.** 37 + 17 = 54
**5.** 76 – 39 = 37
**6.** 20 + 41 = 61

**Challenge**

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**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve given open number sentences without using a number line.

**Extension activity**

Complete the challenge on page 73 in the Pupil's Book.

**Support activity**

If pupils are struggling to complete open number sentences without using a number line, spend some time writing addition and subtraction sentences using three given numbers, such as 3, 4 and 7: 3 + 4 = 7; 4 + 3 = 7; 7 – 3 = 4; 7 – 4 = 3.

## Lesson 3 *Pupil's Book page 73*

### Preparation

You will need to have:
- Large number line
- Pupil's Book

### Starter activity

Multiples game: Focus pupils on pairs of multiples of five which total 100. Ask them to draw a three by three blocks grid in their book. On this grid ask them to write a number ending in five or zero in each square. (Choose from 5, 10, 15, 20 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95.)

Call out one number. If the pupil has the number that is required to make 100 they can cross it off their grid. For example, if the number 45 is called, if the pupil has 55 on their grid they can cross it off. The first pupil to complete crossing the numbers off their grid is the winner.

### Lesson focus

On the board write the equals sign. Ask pupils what the sign means in an equation. Write the equations: 40 + 50 = 90 ; 40 + 50 = 30 + 60.

Ask the pupils if these equations are correct. It is likely all pupils will agree the first equation is correct but many may believe the second equation to be wrong if they have a misconception about the equals sign in an equation. Many pupils believe the equals sign means 'write the answer'.

Other pupils may believe the equals sign means 'is the same as', so while they are happy that 30 + 40 = 30 + 40 and they may be happy that 30 + 40 = 40 + 30, they do not believe that 30 + 40 = 35 + 35.

In fact, the equals sign acts like the centre point of a set of balances. One side of the equals sign must balance the other side. It does not matter how many numbers you have on either side.

Now write a longer open number sentence on the board, such as: 20 + ? = 12 + 15. Explain that the equals sign tells us that both sides of the equation have the same value. Ask pupils how they would go about finding the missing number. Lead them to start on the side that has no numbers missing and work out the value of that side first (27). Now we can fill in the missing value (7).

Work through the examples on page 74 in the Pupil's Book.

Complete Exercises 4 and 5 on page 74 in the Pupil's Book.

### Answers

**Exercise 4**

**1.** 1
**2.** 102
**3.** 30
**4.** 0

**Exercise 5**

Pupils can use a block or a letter to represent the missing number.

**1.** $34 + x = 57$
$x = 23$
**2.** $x - 45 = 55$
$x = 100$
**3.** $58 - 25 = x$
$x = 33$
**4.** $x - 13 = 38$
$x = 51$ m

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Particularly note those pupils who initially showed a misconception regarding the equal sign in an equation. Pupils should be able to solve longer open sentences.

**Extension activity**
Ask pupils to find the missing number in these number sentences:
5 + 8 – 6 = 2 + 4 + ?
14 – 2 – ? = 9 + 4 – 5

**Support activity**
Encourage pupils who are having difficulty with longer open number sentences to talk themselves through the question, using words to help them understand what they are looking for, for example:
12 + 3 = ? – 4. We must add 12 and 3 to give us 15. Now we have: 15 = ? – 4.
We are now looking for a number which should be added to 4 to give 15. To find this number we add 4 to 15. This number is 19.

## Lesson 4 *Pupil's Book page 75*

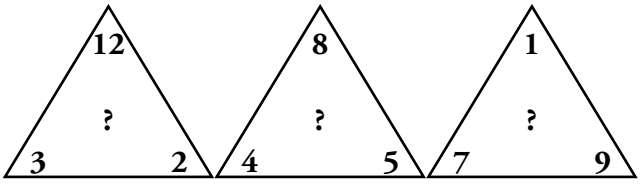
### Preparation
You will need to have:
- Large number line
- Pupil's Book

### Starter activity
Divide the class into two teams. Have the teams line up in front of you and next to each other. Ask the first pair an addition, subtraction, multiplication or division question. The first to call out the answer goes to the back of their team, the other stays at the front. Ask a new question to the next pair.

First to respond correctly goes to the back. The first team to have their first person back to the front is the winning team. Include questions with more than one step, such as 4 + 8 – 2.

### Lesson focus
In this lesson we will work with open number sentences which are laid out as puzzles. Draw the triangle in the example on page 75 in the Pupil's Book on the board and ask pupils to work out the sum or formula used to find the answer in the middle. They will make different suggestions – test each suggestion to see if it leads to the correct answer. If not, discuss why it didn't work. They may need some hints to find the correct formula. Lead them to see that the answer is the difference between the product of the two larger numbers, and the smallest number multiplied by itself.

Practise a few more similar problems on the board, such as:




Complete Exercise 6 on page 75 of the Pupil's Book.

## Answers

**Exercise 6**

**1.** 5
**2.** 20
**3.** 29
**4.** 45
**5.** 32

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve quantitative aptitude problems.

**Extension activity**

Ask pupils to make up three of their own examples like the ones in the exercise. They can swap with a friend and solve each other's examples, and then check each other's answers.

**Support activity**

Solving quantitative aptitude problems such as these requires a good grasp of multiplication, division, addition and subtraction. Work with those pupils who are struggling and help them practise their basic operations once again. Have a short quiz to test their knowledge and set them some practice questions for homework.

# Revision lesson for Unit 18

*Pupil's Book pages 72–75; Workbook page 30*

## Preparation

You will need to have:

- Workbook
- Pupil's Book

## Lesson focus

Revise the work covered in Unit 18:

- Finding a missing number in an open sentence.
- Identifying the relationship between addition and subtraction.
- Solving related quantitative aptitude problems.

Remind pupils of the key word definitions for this unit:

- *open number sentence*: a sum that has a digit missing. it will become true or false depending on the value we fill in
- *formula*: a rule or equation that shows how to work something out

Complete Worksheet 18 (Workbook page 30).

## Answers

**Worksheet 18**

**1.** **a)** 15
**b)** 21
**c)** 47
**d)** 133
**e)** 48
**f)** 24
**g)** 12
**h)** 85
**i)** 138
**j)** 156

**2.** **a)** 29
**b)** 62
**c)** 88
**d)** 145
**e)** 202
**f)** 10
**g)** 98
**h)** 41
**i)** 129
**j)** 24

**3.** **a)** 132
**b)** ₦52

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to find a missing number in an open sentence; identify the relationship between addition and subtraction; and solve related quantitative aptitude problems.

# Unit 19 Changing money

**Objectives**

By the end of this unit, pupils will be able to:

- Change money not exceeding ₦20 into smaller units.

## Suggested resources

You will need to have:

- Pictures of each of the coins and notes used up to 200
- Card or paper coins
- Pupil's Book
- Workbook

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be confident working with numbers to 200. Pupils need to be able to compare and order numbers to 200. Pupils need to be able to recognise and order in value all coins and notes.

## Common errors pupils make

Pupils may confuse the values of different coins; for example, they may think 50 kobo is greater than ₦5, as 50 is larger than 5. Remind pupils that naira are worth more than kobo and practise ordering the value of coins and notes.

## Evaluation guide

Assess whether pupils can:

- Say how many of a given smaller denomination are contained in a bigger denomination.

## Lesson 1 *Pupil's Book page 76*

### Preparation

You will need to have:

- Pictures of notes
- Coins or pictures of coins
- Pupil's Book

### Starter activity

Count in tens from 0 to 200 and back. Hold up pictures of coins (or actual coins) and ask pupils to say the value of each coin.

### Lesson focus

Show the pupils the coins spent in Nigeria. Ask them to pick out specific coins from a pile of mixed coins. Hand round the class the pictures of the notes and ask pupils to describe what they see on them. What words, numbers, pictures and colours are on each note? Ensure that everyone gets to have a look at each picture. Ask five pupils to come to the front and give each a picture of a different note, in any order. Ask each pupil in turn to hold up their picture of a note and ask the class to say how much each note is worth.

Explain to pupils that different coins or notes can be used together instead of a single coin or note - we do not always have the exact coins or notes we need, so we need to know how many of each coin or note makes another. For example, ₦20 can be made by either a single ₦20 note or two ₦10 notes. Draw the notes on the board. How else could you make ₦20? Draw the notes and coins on the board as pupils give ideas. Ideas may include, four ₦5 notes, ten ₦2 coins, twenty ₦1coins, one ₦10 note and two ₦5 notes, one ₦10 note and five ₦2 coins, etc. Encourage pupils to find as many ways as possible, also including some 50k coins. Remind pupils that the coins do not need to be all the same.

Work through the example on page 76 in the Pupil's Book, and complete Exercise 1.

### Answers

**Exercise 1**

**1.** 2
**2.** 2
**3.** 5
**4.** two 50 kobo coins
**5.** **i)** two ₦1 coins
**ii)** four 50 kobo coins
**iii)** two 50 kobo coins and ₦1 coin
**6.** **i)** five ₦2 coins
**ii)** four ₦2 coins and two ₦1 coins
**iii)** twenty 50 kobo coins
**7.** **i)** two ₦2 coins and one ₦1 coin
**ii)** five ₦1 coins
**iii)** two ₦1 coins and six 50 kobo coins

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify all coins and notes used and know and use the equivalence of coins. Pupils should be able to lay out coins to a given value, including finding alternative ways to make the same amount.

**Extension activity**

Complete the challenge on page 76 in the Pupil's Book. (Many different ways, check that the pupils' responses are reasonable and add up to ₦10.)

**Support activity**

Give those pupils who need extra practice a pile of pretend coins and ask them to show you how to make up different values. For example, ask them to show you how they can use their coins to make ₦1, ₦2, ₦5, ₦10, etc.

## Lesson 2 *Pupil's Book page 77*

### Preparation

You will need to have:

- Pictures of notes and coins
- Pupil's Book

### Starter activity

Count from 0 to 200 in fives, tens and twenties and back again. Ask pupils simple multiplication questions such as:
5 times 5;
2 lots of 10;
10 multiplied by 5.

### Lesson focus

Show pupils a picture of a one naira note and a kobo coin and ask them how many kobo coins make up one naira? (100). Now ask them how many kobo coins make up 2, 3, 4 and 5 naira? They should notice that they need to multiply by 100 each time. Now ask them to change these amounts from naira to kobo:
2,50;
10;
3,25;
8,53;
4,11;
0,72

Complete Exercise 2 on page 77 in the Pupil's Book.

### Answers

**Exercise 2**

**1.** 600k
**2.** 150k
**3.** 360k
**4.** 512k
**5.** 308k
**6.** 82k

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to change naira to kobo.

**Extension activity**

Complete the puzzle on page 77 in the Pupil's Book. Check that answers are reasonable and add up to ₦45.

**Support activity**

Give your pupils extra practice changing naira to kobo by writing examples on the board. Do the examples together as a class and note which pupils need extra help.

## Lesson 3 *Pupil's Book page 77*

### Preparation

You will need to have:

- Pictures of coins and notes
- Pupil's Book

### Starter activity

Play ₦10 Notes. Ask: I paid ₦140; how many ₦10 did I use? How many ₦10 notes in ₦100? (10). How many ₦10 in ₦40? (4). Altogether 14 notes will be used.

Repeat for other tens numbers: 210; 150; 340; 270. Each time, ask the pupils to explain their answer; explanations should include the number of tens in each hundred. Just taking the zero off is not a mathematical reason, it is merely an observation of the result.

### Lesson focus

Refer back to the previous lesson and ask pupils how they would change ₦1, ₦2, ₦5 and ₦10 into kobo. They should remember to multiply by 100. Now ask them how they would do the reverse – change kobo into naira. Divide by 100.

Ask them to change these amounts from kobo to naira: 280; 1 000; 375; 44; 612; 1432.

Complete Exercise 3 on page 77 in the Pupil's Book.

### Answers

**Exercise 3**

**1.** ₦8
**2.** ₦1,50
**3.** ₦2,08
**4.** ₦4,80
**5.** ₦1,10
**6.** ₦2,25

**Homework activity**

| Naira | Kobo |
|---|---|
| 2,80 | 280 |
| 12,43 | 1 243 |
| 0,76 | 76 |
| 19 | 1 900 |
| 7,02 | 702 |
| 3,01 | 301 |

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to change kobo to naira.

**Homework activity**

Ask pupils to copy and complete this table for homework:

| Naira | Kobo |
|---|---|
| 2,80 | |
| 12,43 | |
| | 76 |
| | 1 900 |
| 7,02 | |
| | 301 |

**Support activity**

Give your pupils extra practice changing kobo to naira by writing examples on the board. Do the examples together as a class and note which pupils need extra help.

## Revision lesson for Unit 19

*Pupil's Book pages 76–77; Workbook page 31*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 19:

- Changing money not exceeding ₦20 into smaller units.

Complete Worksheet 19 (Workbook page 31).

### Answers

**Worksheet 19**

**1.** Teacher to check – many different possible answers.

**2.** **a)** 4
**b)** 5
**c)** Two ₦2, one ₦1 and two 50 kobo; *or* one ₦2, one ₦1 and four 50 kobo; *or* one ₦2, two ₦1 and two 50 kobo

**3.** **a)** 400
**b)** 3
**c)** 207
**d)** 410
**e)** 8,09
**f)** 6,15
**g)** 525
**h)** 7,18
**i)** 180
**j)** 267

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to change money not exceeding ₦20 into smaller units.

# Unit 20 Shopping with money

**Objectives**

By the end of this unit, pupils will be able to:

- Shop effectively with money not greater than ₦20 using the idea of addition and subtraction.

## Suggested resources

You will need to have:

- Addition and subtraction cards
- Pretend money or paper copies of notes and coins
- Items to use in a pretend shop
- Pupil's Book
- Workbook

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be able identify all coins and notes used. Pupils need to be confident adding and subtracting numbers to 200.

## Common errors pupils make

Pupils may try to add or subtract amounts without making sure they are both either written in naira or kobo, for example, incorrectly adding ₦5.50 and 10k to get ₦15.50. Make sure that they change both amounts to either naira or kobo before adding or subtracting. It may be easier for pupils to work in kobo, as then they will not need to worry about the decimal place. Make sure they write their final answers in naira especially if they are greater than 100k.

## Evaluation guide

Assess whether pupils can:

- Do given exercises on addition and subtraction of money.

## Lesson 1 *Pupil's Book page 78*

### Preparation

You will need to have:

- Items to sell in pretend shops
- Pretend money
- Pupil's Book

### Starter activity

Ask a variety of quick-fire addition questions, such as:
What is double 25?
29 plus 31?
17 add 76?
65 and 7?

### Lesson focus

Draw a collection of coins and notes on the board and ask pupils to find the total. Encourage pupils to use their addition strategies, such as doubles, largest number first, multiples of 10, etc.

Set up several stalls with a variety of objects priced from 1 to 100. Ask two pupils to stand by each stall as the sellers. Give the pupils pretend money to pay with and ask them to go to a stall and buy three items.

Stall sellers must give the total price of the three items. Customers must have the exact money. Provide a piece of paper and a pencil to help them add the total. Swap round some customers and sellers to allow everyone to have a turn. Wander round to each stall and listen to pupils. If some pupils find adding three items too challenging ask them to choose just two.

Work through the examples on page 78 in the Pupil's Book, reminding pupils of the addition strategies they have worked with previously.

Ask pupils to complete Exercise 1 (Pupil's Book page 79). Write the prices for the items in questions 1 and 2 on the board:

- Skirt – ₦4
- Book – ₦3
- Tin of milk– ₦7,60
- Sugar – ₦1,20

### Answers

**Exercise 1**

1. ₦7
2. Yes she has enough (it costs ₦11,80).
3. Book, pencil and ruler – ₦8,50.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to shop effectively with amounts not greater than ₦20 using addition. They should be able to easily add two amounts, and most pupils should manage to add three amounts. Encourage them to use pen and paper to help them add more than two amounts and to make use of addition strategies learnt earlier in the year.

**Extension activity**

Complete the puzzle on page 79 in the Pupil's Book.

**Support activity**

Give your pupils extra practice adding two amounts of money. Encourage pupils who are struggling to write down the amounts they are adding vertically and use the column method to add them.

## Lesson 2 *Pupil's Book page 80*

### Preparation

You will need to have:
- Items to sell in pretend shops
- Pretend money
- Pupil's Book

### Starter activity

Ask quick-fire subtraction questions with numbers to 100, such as:
What is 70 minus 30?
55 take away 20?
20 subtract 17?
50 take away 24?
90 minus 45?

### Lesson focus

Explain to pupils that we don't always have the exact money to pay for items. Sometimes we need to get change. For example: If I buy a book that costs ₦12 and I give the seller a ₦20 note, how much change would I need? We can work out the change needed by putting it into a simple subtraction calculation. 20 – 12 = 8. So I need ₦8 change. How can I make 8? Maybe ₦5, ₦2 and ₦1 coins.

Set up the stalls again with objects priced from ₦1 to ₦100. Ask two pupils to stand on each stall as the sellers and ask the rest of the class to be the customers. Customers may choose one or two items to buy. This time the customers do not need to give the exact amount as the seller can work out the change to give them. Again provide paper and pencil to help their calculations. Lead pupils to do subtraction of money using the vertical method.

Work through the example on page 80 in the Pupil's Book.

Write the prices for the following objects in Exercise 2 and 3 on the board and then ask pupils to complete Exercise 2 and 3 (Pupil's Book page 81).
- Shorts ₦2
- Dress ₦7

### Answers

**Exercise 2**

**1.** ₦20
**2.** 50k
**3.** ₦2,70
**4.** ₦32,50
**5.** ₦72
**6.** ₦3
**7.** ₦1,20

**Exercise 3**

**1.** ₦5
**2.** ₦1,20
**3.** ₦4,80
**4.** ₦6,40

**Extension**

5

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to shop effectively and give the correct amounts of change with amounts not greater than ₦20 using subtraction.

**Homework activity**
Pupils can complete Exercise 3 if they did not finish it in class.

**Extension activity**
Complete the challenge on page 81.

**Support activity**
Give pupils extra practice subtracting money using the vertical method. Work through Exercise 2 with them slowly, helping them to set up the subtractions vertically and then carry them out.

## Revision lesson for Unit 20

*Pupil's Book pages 78–81; Workbook page 32*

### Preparation

You will need to have:
- Workbook;
- Pupil's Book.

### Lesson focus

Revise the work covered in Unit 20:
- Shop effectively with money not greater than ₦20 using the idea of addition and subtraction.

Complete Worksheet 20 (Workbook page 32).

Tell the pupils that a pencil costs ₦2.

### Answers

**Worksheet 20**

**1.** **b)** ₦7,50
**c)** ₦3
**d)** ₦5
**e)** ₦7,50

**2.** **b)** ₦12,50
**c)** ₦17
**d)** ₦15
**e)** ₦12,50

**3.** **b)** ₦8,05
**c)** ₦10,25
**d)** ₦17,96
**e)** ₦18,92

**4.** **b)** ₦8,84
**c)** ₦8,84
**d)** ₦5,20
**e)** ₦14,19

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to shop effectively with amounts not greater than ₦20 using addition and subtraction.

# Unit 21 Multiplying money

**Objectives**

By the end of this unit, pupils will be able to:

- Perform simple multiplications with money with product not exceeding ₦20.

## Suggested resources

You will need to have:

- Pretend money
- Items to use in pretend shop
- Pupil's Book
- Workbook

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be able to multiply whole numbers with products up to 200.

## Common errors pupils make

Look out for common multiplying errors especially when pupils need to rename numbers when multiplying.

## Evaluation guide

Assess whether pupils can:

- Solve given problems with multiplication including money with products not exceeding ₦20.

## Lesson 1 *Pupil's Book page 82*

### Preparation

You will need to have:

- Pretend money
- Items to use in pretend shop
- Pupil's Book

### Starter activity

Play *₦10 Notes*. Ask: I paid ₦120; how many ₦10 did I use? Show, by counting in tens up to 120, that there are 12 × 10 in 120. Repeat for other tens numbers: 280; 110; 370; 850.

### Lesson focus

Show pupils a few items with price tags, such as apples, pencils, books, etc. Ask them questions such as: I buy 3 apples, how much would I pay? I buy 10 pencils, how much would I pay? How much would it cost to buy a book for each pupil in the class?

Ask them how they worked the answers out; some pupils will use repeated addition, others will see that they can just multiply the cost of the item by the number of items bought. Explain that when we buy many of the same item for the same price, we work out the cost by multiplying.

Work through the examples on page 82 in the Pupil's Book, pointing out that the first example is multiplication using repeated addition and the second is multiplication with renaming. Guide your pupils to convert kobo to naira by dividing by 100 for their final answers.

Complete Exercise 1 on page 83 in the Pupil's Book. Tell the pupils that a sweet costs 20 kobo.

### Answers

**Exercise 1**

1. ₦10
2. ₦1,60
3. ₦10
4. ₦14
5. ₦17,20
6. ₦8
7. ₦17,50
8. ₦20

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve given problems with multiplication including money with products not exceeding ₦20.

**Extension activity**

Complete the puzzle on page 83 in the Pupil's Book (they both have the same amount of change as they both spend ₦14).

## Lesson 2 *Pupil's Book page 83*

### Preparation

You will need to have:
- Pretend money
- Pupil's Book

### Starter activity

Each pupil draws a 4 × 4 grid in their book. They choose which 16 numbers to write on their grid. Put two copies of each of the digits 0–9 into a bag, and draw out two cards and read the two numbers as a multiplication. For example, 3 and 4: call out 3 × 4. Any pupil with the number 12 on their card will cross off the number 12. Return the cards to the bag, and repeat.

The winner is whoever has a complete row, horizontal, vertical or diagonal. If time permits or the winner could be the first completed grid.

### Lesson focus

Remind pupils that if the cost of one item is known, the cost of a number of them is obtained by multiplying the cost by the number of items. Revise the methods used to multiply – repeated addition and the column method. Work through the following examples, using both methods for each:
- 12k × 8
- 32k × 3
- ₦2.25 × 4

Complete Exercises 2 and 3 on page 83 in the Pupil's Book, working alone. Remind pupils to write their final answers in naira if it is more than 100k (divide the number of kobo by 100).

### Answers

**Exercise 2**

**1.** 36k
**2.** 60k
**3.** 60k
**4.** 136k = ₦1,36
**5.** 48k
**6.** 40k
**7.** 92k
**8.** 160k = ₦1,60
**9.** 285k = ₦2,85
**10.** 96k

**Exercise 3**

**1.** 96k
**2.** 36k
**3.** 405k = ₦4,05
**4.** 180k = ₦1,80
**5.** 392k = ₦3,92
**6.** 96k
**7.** 392k = ₦3,92
**8.** ₦5
**9.** 308k = ₦3,08
**10.** ₦12.8

**Challenge**

12 balls

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve given problems with multiplication including money with products not exceeding ₦20.

**Homework activity**

Pupils can complete Exercise 3 for homework if they did not complete it in class.

**Extension activity**

Complete the challenge on page 83.

**Support activity**

Allow pupils to use pretend coins or notes to help them understand multiplication of money. Give them a pile of coins and notes and ask them questions, such as: if you buy 2 pencils for ₦1.50 each, show me how much you owe. They may need to hand over ₦1.50 twice and then count the total at first, but as they get more practice they should see that they need to multiply ₦1.50 by 2.

## Revision lesson for Unit 21

*Pupil's Book pages 82–83; Workbook page 34*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 21:

- Performing simple multiplications with money with product not exceeding ₦20.

Complete Worksheet 21 (Workbook page 34).

### Answers

**Worksheet 21**

**1. a)** 20k
**b)** 120k = ₦1,20
**c)** ₦10
**d)** ₦8
**e)** ₦5
**f)** ₦20
**g)** ₦10
**h)** ₦10
**i)** ₦10,50
**j)** ₦14

**2. a)** 15 pencils
**b)** 8 erasers
**c)** ₦5 change

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to shop perform simple multiplications with money with product not exceeding ₦20.

# Unit 22 Measuring and comparing lengths (non-standard measures)

**Objectives**

By the end of this unit, pupils will be able to:

- Measure the length and/or width of room, table, building and straight-edged materials.

## Suggested resources

You will need to have:

- Paper clips
- Blocks
- Objects to measure (such as desks, books, etc.)
- Paper for tracing
- Pupil's Book
- Workbook

## Key word definitions

*measuring:* finding a number that shows the size (length, width, height) of something
*non-standard measure:* when we use our bodies or objects around us to measure length
*hand span:* the width of your hand
*cubit:* the length of your forearm (from your elbow to the tip of your middle finger)
*stride:* a big step
*arm span:* the distance between the tips of your fingers when you stretch your arms as wide as you can
*height:* the measurement from the top to the bottom of an object or person
*width:* the measurement of an object from side to side
*length:* the measurement from one end to the other
*estimate:* a close guess of the actual value

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to work with numbers to 100. They need to be able to add and subtract numbers to and from 100.

## Common errors pupils make

Pupils may incorrectly measure if they do not start the measurement from the end or edge. They may also make errors if the non-standard measures they use do not meet each other (i.e. if they leave gaps between their hands/paper clips, etc.) when measuring.

## Evaluation guide

Assess whether pupils can:

- Measure given objects using hand spans and other non-standard measures.

## Lesson 1 *Pupil's Book page 84*

### Preparation

You will need to have:

- Paper for tracing
- Scissors
- Pupil's Book

### Starter activity

Ask pupils to trace their right shoe on paper and cut it out. Then ask them to write down objects which are shorter than, about the same and longer than their shoe. Have them compare answers and discuss how a shoe can be used as a measurement guide. Ask them questions like: how many shoes would fit across the length of the door; your desk; your book; the classroom?

### Lesson focus

Ask pupils to think of different tools they can use to measure items such as their desk, book, classroom etc. Write down all their suggestions. Lead them to a discussion of the non-standard measures shown on page 84 in the Pupil's Book, and explain how to use each measure (hand span, cubit, stride, foot length, arm span).

Let your pupils use non-standard measures to measure a few objects in the classroom, such as their desk, book, the door and the window. Have them compare their answers to see how similar they are. Discuss which measures are appropriate for different objects. For example, a stride is appropriate for measuring the length of the classroom, but not for measuring the length of a book. An object such as a paper clip is appropriate for measuring the length of a pencil, but not the length of the classroom.

Complete Exercise 1 on page 85 in the Pupil's Book.

### Answers

**Exercise 1**

Different possible answers – teacher to check that appropriate measures are used.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to select the appropriate non-standard measure to measure the lengths of different objects.

**Extension activity**

Ask pupils to think of more non-standard measures not used in this unit which could be used to measure length.

## Lesson 2 *Pupil's Book page 85*

### Preparation

You will need to have:

- Straight-edged objects for estimating length, such as book, pencil, eraser, etc.
- Pupil's Book

### Starter activity

Show pupils a few objects, such as a pencil, eraser, textbook, ruler and other straight-edged objects, and ask them to:

- Choose the best non-standard measure we can use to measure this object.
- Estimate (guess) the length of this object using that measure.

Compare their estimates and discuss why their answers are not all the same.

### Lesson focus

Use the starter activity to discuss the concept of estimation. Ask pupils why they think estimation is useful. Discuss how estimates should not be wild guesses, but should be as close to the actual value as possible.

Have pupils complete Exercises 2 and 3 on page 85 in the Pupil's Book, giving them guidance where necessary. Walk around and discuss pupils' estimates with them, ask them to explain their reasoning when estimating. Make sure they are not doing any actual measuring while completing Exercise 2.

### Answers

**Exercise 2**

Teacher to check that pupils' estimates are reasonable.

**Exercise 3**

Teacher to check that the pupils' measurements are reasonable.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to estimate and measure the length of items using non-standard measures.

**Extension activity**

Pupils can work in small groups and compare their estimates and actual measurements with each other to see whose estimates are the closest to the actual lengths. If their measurements differ they should re-measure those items as a group to decide on the most correct measurement.

**Support activity**

Give pupils extra practice using non-standard measure by asking them to measure a few more items, and guiding them to select the most appropriate non-standard measure.

## Lesson 3 *Pupil's Book page 86*

### Preparation

You will need to have:

- Pupil's Book
- Paper clips

### Starter activity

Draw a few straight lines of different length on the board. Ask pupils to estimate the length of each line using these units: paper clips, hand span. Call pupils forward to measure the lines using the two units and see how close their estimates are to the actual measurements.

### Lesson focus

Remind pupils of the various non-standard measures used in this unit. This lesson provides further practice with non-standard measurement and will help to develop an understanding of why there are different possible answers when using non-standard measures.

Complete Exercises 4 and 5 on page 86 in the Pupil's Book. Pupils should work alone for Exercise 4 and work in pairs for Exercise 5. Before they start Exercise 5, ask two pupils of differing heights to come forward and give their measurement for the length of the classroom, using strides. Discuss why the two answers are different, which pupil's stride is greater, and how this affects their measurement.

### Answers

**Exercise 4**

Teacher to check that measurements are reasonable.

**Exercise 5**

Teacher to check that pupils' measurements are reasonably accurate.

**Homework activity**

Teacher to check that pupils' measurements are reasonably accurate.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to use non-standard measures to measure length. They should have an understanding of why they will have different answers to their classmates when using non-standard measures.

**Homework activity**

Ask pupils to measure some lengths at home, such as the length of their house, the width of their front door, the length of a table, etc. using appropriate non-standard measures.

**Extension activity**

Complete the puzzle on page 86 in the Pupil's Book.

**Support activity**

If pupils are still struggling to use non-standard measures, spend some time with them individually and guide them through the exercises.

## Lesson 4 *Pupil's Book page 87*

### Preparation

You will need to have:
- Paper clips
- Pupil's Book

### Starter activity

Ask pupils to arrange themselves in order of height from shortest to tallest. Have them compare hand span, arm span, cubit, stride and foot length with the person on either side of them. Lead them to make observations about non-standard measures and how they vary from person to person.

### Lesson focus

Use the starter activity to introduce Exercise 6 on page 87 in the Pupil's Book. Read through the exercise first with the class and then ask them to complete the exercise in groups of two or three.

### Answers

**Exercise 6**

Teacher to check answers.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to use non-standard measures to measure length.

**Extension activity**

Complete the challenge on page 87.

## Revision lesson for Unit 22

*Pupil's Book pages 84–87; Workbook page 35*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 22:
- Measuring the length and/or width of room, table, building and straight-edged materials.

Remind pupils of the key word definitions for this unit:
- *measuring*: finding a number that shows the size (length, width, height) of something
- *non-standard measure*: when we use our bodies or objects around us to measure length
- *hand span*: the width of your hand
- *cubit:* the length of your forearm (from your elbow to the tip of your middle finger)
- *stride*: a big step
- *arm span*: the distance between the tips of your fingers when you stretch your arms as wide as you can
- *height*: the measurement from the top to the bottom of an object or person
- *width*: the measurement of an object from side to side
- *length*: the measurement from one end to the other
- *estimate*: a close guess of the actual value

Complete Worksheet 22 (Workbook page 35).

### Answers

**Worksheet 22**

**1.** **a)** hand span
**b)** cubit
**c)** stride
**d)** foot length
**e)** arm span

**2.** Teacher to check that answers are reasonable, and that appropriate measures are used.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to identify various non-standard measures and measure given objects using these non-standard measures.

# Term 2 Investigation

**Objectives**

- This investigation forms part of a summative assessment of work covered in Units 12 to 21. It specifically provides the opportunity for pupils to use addition, subtraction, multiplication and division when solving problems, including those involving money.
- The investigation is designed to assess pupils' mathematical understanding and ability to apply their knowledge in different contexts. It encourages investigative thinking and problem-solving.
- It is best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to the pupils and give them time to complete the question or activity in their group before moving on to the next question. The teacher should monitor individuals within the group to make sure all are participating and able to answer the questions.

## Part 1: Create numbers in many ways

*Pupil's Book page 88*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Write the number 48 on the board. Explain to pupils that 48 is the target number. Then write the following calculations on the board:

50 + 7 – 9

80 ÷ 10 + 4

12 × 4 – 0

Ask pupils to work out which of these calculations equal the target number. (First and last.) Ask them to think of a calculation that equals the target number 48. Ask a couple of pupils to share their calculations with the class.

### Lesson focus

Ask pupils to read through the investigation in the Pupil's Book. Answer any questions they may raise and get them to complete the investigation.

Encourage them to check their answers and calculations carefully. Encourage them to use a variety of addition, subtraction, multiplication and division in their calculations.

### Answers

**1.** **a)** 67
**b)** 67
**c)** 67
**d)** 67
**e)** 61
**f)** 53
**g)** 60
**h)** 62

**2.** Teacher to check, many possible answers.

**3.** Teacher to check, many possible answer.

**Puzzle**

Tom added 13 and 7 and then multiplied the answer (20) by 5 to get 100. Mary first multiplied 7 and 5 to get 35 and then added 13 to get the correct answer of 48.

**Assessment**

An investigation of this nature provides the teacher with a lot of information regarding the pupils' understanding of the number concepts learnt so far. It provides information on the pupils' mathematical knowledge and information on the strategies pupils are using to solve addition and subtraction problems. Pupils should be able to use addition, subtraction, multiplication and division facts to solve problems.

**Support activity**

Pupils can continue with this investigation while teachers work with small groups who require extra support as identified in summative assessments.

## Part 2: Shopping with money

*Pupil's Book page 89*

### Preparation

You will need to have:

- Items for pupils to use in their shops
- Card to make money
- Pupil's Book

### Starter activity

Revise adding, subtracting and multiplying money by asking pupils to answer questions such as:

- I buy a shirt for ₦2.60 and shorts for ₦3.50. How much do I owe?
- I pay with a ₦10 note, what change do I receive?
- I buy six bananas at ₦1.50 each, two pineapples at ₦2 each and four melons at ₦3 each. How much do I owe?
- How much change will I receive if I pay for my fruit with a ₦20 note?

### Lesson focus

Have pupils work with a partner and read through the instructions on page 89 in the Pupil's Book the day before the investigation is to be carried out. They are to bring items from home (but you should have a selection of items for those pupils who are not able to bring items from home).

Pupils can follow the instructions in the Pupil's Book to make their price tags and pretend money, and then begin their shopping. Make sure they are taking turns to be the shopper and the shop owner. They can use pencil and paper to help them carry out their calculations if necessary.

### Answers and assessment

Teacher to observe and check pupils' calculations. Make sure they can correctly add amounts and work out the correct amounts of change needed.

An investigation of this nature provides the teacher with a lot of information regarding the pupils' understanding of the money concepts learnt so far. It provides information on the pupils' mathematical knowledge and information on the strategies pupils are using to solve addition, subtraction and multiplication problems involving money. Pupils should be able to use addition, subtraction and multiplication strategies to solve problems.

# Term 2 Assessment

**Objectives**

- This assessment is a summative assessment of work covered in Units 12 to 22.
- This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a pupil may be having with particular concepts.

## Guidelines

- It is therefore best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to the pupils and give them time to complete the question before moving on to the next question.
- A more able group within the class may be able to complete the assessment without the need for the teacher to read the questions. However, observing pupils while they are completing the assessment, provides further information about their abilities.
- On completion of the assessment, teachers should look for correct answers and mistakes made by individuals. They should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an assessment, teachers can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities. They are also able to identify any weaknesses in their teaching programme and make adjustments as necessary.

## Preparation

You will need to have:

- Pupil's Book

## Answers

**1. a)** $\frac{2}{4}$

**b)** $\frac{4}{6}$

**c)** $\frac{3}{3} = 1$

**d)** $\frac{7}{6}$

**2.**

| × | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 |
| 2 | 2 | 4 | 6 | 8 | 10 |
| 3 | 3 | 6 | 9 | 12 | 15 |
| 4 | 4 | 8 | 12 | 16 | 20 |
| 5 | 5 | 10 | 15 | 20 | 25 |

**3.** 24 + 24 + 24 = 72

**4. a)** 48
**b)** 100
**c)** 88
**d)** 96
**e)** 203
**f)** 12
**g)** 56
**h)** 135
**i)** 336

**5. a)** 3
**b)** 4
**c)** 4
**d)** 6
**e)** 18
**f)** 7

**6.** 7 mangoes

**7.** **a)** 1, 2, 4
**b)** 1, 2
**c)** 1, 2, 4, 8
**d)** 1, 3, 5, 15
**e)** 1, 3, 7, 21
**f)** 1, 5, 7, 35

**8.** **a)** 5, 10, 15, 20
**b)** 2, 4, 6, 8
**c)** 6, 12, 18, 24
**d)** 8, 16, 24, 32

**9.** **a)** 7
**b)** 13

**10.** Many possible answers. Check that the total is ₦10.

**11.** I have spent ₦16 and I will get ₦4 change.

**12.** ₦13.50

# Unit 23 Measuring and comparing lengths (standard measures)

**Objectives**

By the end of this unit, pupils will be able to:

- Measure the length and/or width of room, table, building and straight-edged materials.
- Mention the importance/benefit of standard units of measurement.
- Add lengths.
- Solve given problems involving measurement of length and/or width.

## Suggested resources

You will need to have:

- Centimetre rulers
- String or strips of paper
- Metre rulers or tape measures
- Three objects measuring 15 cm, 20 cm, 25 cm
- Two metres of ribbon
- Scissors
- Pupil's Book
- Workbook

## Key word definitions

*accurate:* correct and exact
*standard:* standard measures are the same everywhere in the world
*centimetre:* a unit for measuring length, equal to one hundredth of a metre
*abbreviate:* to shorten
*metre:* a unit for measuring length, equal to a hundred centimetres

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to work with numbers to 100. They need to be able to add and subtract numbers to and from 100.

## Common errors pupils make

Pupils may incorrectly measure if they do not start the measurement from the end or edge. Remind pupils to place the 0 end of ruler or measuring tape at the edge or end of the object they are measuring.

## Evaluation guide

Assess whether pupils can:

- Measure given objects using standard units.
- Estimate length using standard units.
- Add lengths given in standard units.

## Lesson 1 *Pupil's Book page 92*

### Preparation

You will need to have:

- Centimetre rulers
- String or strips of paper measuring 15 cm, 30 cm, 50 cm, 1 m
- Pupil's Book

### Starter activity

Hold up the 30 cm strip of paper or string. Tell pupils how long it is and then ask them to name an object shorter than 30 cm, and then longer than 30 cm, that is found in the room. Check pupils' answers by asking them to take the string or paper to the object and compare. Repeat with the 15 cm, 50 cm and 1 m lengths.

### Lesson focus

Show pupils a centimetre ruler and ask them what it is used for. Ask one pupil to explain how to use it to measure accurately. Ensure each pupil has a centimetre ruler to use. Ask them to use their rulers to measure the longest side of their Pupil's Books. Remind them to place the zero end of the ruler at the edge of the book. If there are any pupils who have a different measurement, ask them to explain what they did.

Ask pupils to complete Exercises 1 (Pupil's Book page 92).

### Answers

**Exercise 1**

**1.** 4 cm, 2,8 cm, 1,7 cm
**2.** 4 cm
**3.** Teacher to check lines.
**4.** Teacher to check measurements.

**Assessment**

Observe pupils whilst measuring during the class activity and when completing the exercises from the Pupil's Book. Pupils should be able to measure lengths in centimetres and explain why standard measures such as centimetres are more reliable than non-standard measures.

**Extension activity**

Ask pupils to use their measurements to place the non-standard measures in question 4 in order from shortest to longest.

**Support activity**

Give pupils extra practice with measuring by asking them to measure the length of a few pieces of string. Make sure that they are placing the zero end of the ruler at the edge of the string.

## Lesson 2 *Pupil's Book page 93*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask pupils to use the centimetre rulers to measure:

- the length of their feet;
- the distance from their knee to the ground;
- the length of their little fingers.

### Lesson focus

Talk about the things that were measured during the previous lesson. Compare the pupils' measurements for the non-standard measures. Discuss how using standard measures such as centimetres is more accurate than using non-standard measures.

Ask two or three pupils to come to the front and give them a centimetre ruler. Stand with your back against the board and ask a pupil to mark on the board your height. Ask another to use the centimetre ruler to measure your height in centimetres.

Pupils can complete Exercises 2 and 3 on page 93 in the Pupil's Book, working in pairs.

### Answers

**Exercise 2**

**1.** 4 cm long, 2 cm wide
**2.** 2 cm long and 2 cm wide
**3.** 3,4 cm long and 2,9 cm high
**4.** 3 cm long and 2,5 cm wide
**5.** 2,6 cm long and 2,6 cm wide
**6.** 4 cm long and 2 cm wide

**Exercise 3**

Teacher to supervise and check measurements.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to measure, compare and order lengths in centimetres.

**Extension activity**

Ask pupils to write their heights in centimetres on a sheet of card or paper and work together to put themselves in a line of shortest to tallest.

**Support activity**

Guide the pupils as they measure the shapes in the exercise. Give extra practice by having them measure objects in the classroom, such as the window frame, the board, the cupboard etc. Encourage the correct use of terms like height, width and length.

## Lesson 3 *Pupil's Book page 94*

### Preparation

You will need to have:

- Metre stick or tape
- Pupil's Book

### Starter activity

Ask pupils to think of three things taller than a metre, and three things shorter than a metre. Ask them to share their ideas with the class. You may like to make a list on the board. Ask them if they can think of any objects that are about one metre.

### Lesson focus

Explain to pupils that there are 100 cm in one metre, and that when a measurement is more than 100 cm we change it to metres. Give them a few examples and ask them to change from centimetres to metres, such as: 145 cm; 238 cm; 102 cm.

Work through the example in the Pupil's Book, page 94.

Remind pupils how we use a metre stick or tape. If using a metre stick ensure that the end of the stick is marked by a finger or mark on the object or area being measured, and that that point is where the next metre starts. If using a measuring tape, the same applies, but in addition, they must remember to keep the tape tight.

Either in small groups or as a class, ask the pupils to complete Exercise 4 (Pupil's Book page 94). They should only count whole metres when measuring.

### Answers

**Exercise 4**

**1.** Teacher to check answers.
**2.** Teacher to check measurements.
**3.** Teacher to check measurements.

**Assessment**

Observe and listen to the pupils throughout the lesson. From the starter activity, do they understand how much a metre is? During the lesson, are they measuring accurately, using the metre sticks or tape correctly? Pupils should be able to measure in whole metres.

**Extension activity**

Pupils can complete the puzzle on page 94 in the Pupil's Book (5 895 m)

**Support activity**

For extra practice, ask pupils to measure in metres:

- how far they can jump;
- how far they can throw a ball;
- how far it is from their classroom to the playground.

## Lesson 4 *Pupil's Book page 95*

### Preparation

You will need to have:

- Centimetre rulers
- Three objects measuring 15 cm, 20 cm, 25 cm
- Pupil's Book

### Starter activity

Ask three pupils to come to the front and give the first pupil the object measuring 20 cm, the second pupil the object measuring 25 cm and the third pupil the object measuring 15 cm. Ask them to estimate in centimetres the measurements of these objects. How can we make sensible estimates? Tell pupils that one object measures 15 cm, one measures 20 cm, and the other measures 25 cm. Ask them to say which is which. How do they know this? You can see that the second object is longer than the first and the last is shorter than both the first and the second.

### Lesson focus

Remind pupils that they need to make sensible estimates. Ask them to find an object in the classroom that they estimate to be 10 cm long. Ask them to measure their objects. How close were they to 10 cm?

Ask pupils to complete Exercise 5 (Pupil's Book, page 95), working in pairs.

### Answers

**Exercise 5**

Teacher to supervise and check answers.

**Worksheet 23**

**4.** Teacher to check.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. How close are their estimates? Pupils should be able to measure, compare, order and estimate lengths in centimetres. Pupils should be able to compare estimates to actual measurements.

**Extension activity**

Ask pupils to estimate how many centimetres the width of the chalkboard is. Measure the board as a class.

**Support activity**

If pupils are struggling to make reasonable estimates, show them once again how to use a known measurement (for example a metre stick or centimetre ruler) to estimate the measurement of another. For example, in order to estimate the height of their desk, ask: Is it taller or shorter than a centimetre ruler? Is your desk taller or shorter than a metre stick? Help them use their answers to estimate the height of their desks.

**Homework activity**

Worksheet 23 question 4 (Workbook page 37).

## Lesson 5 *Pupil's Book page 96*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask oral questions such as what is: double 8; 8 add 9; 10 plus 10; double 6; 7 and 6; 20 take away 8; 18 take away 11; half of 18?

Introduce larger doubles such as double 20, double 25, double 30, etc. Practise different doubles and halves in preparation for the main part of the lesson.

### Lesson focus

Remind pupils that when we add together measurements it is just like simple addition but with units – as long as the units are the same units. For example, if we have 35 cm and we want to add 23 cm, the total would be 58 cm. Tell pupils that they must remember the units. Remind them that they can also use number facts to help their addition, such as 25 cm + 26 cm = ? We know that 25 + 25 = 50, so 25 cm + 25 cm + 1 cm = 51 cm.

Ask pupils: What is 20 cm plus 45 cm? 42 cm add 39 cm? 64 cm and 45 cm? 12 m add 20 m? 14 m plus 25 m? Discuss the different strategies they can use to add these larger numbers, drawing on strategies taught in previous units.

Work through the example on page 96 in the Pupil's Book and then complete Exercises 6 and 7 (Pupil's Book page 96).

### Answers

**Exercise 6**

Teacher to monitor and check drawings and measurements.

**Exercise 7**

**1.** 45 cm
**2.** 75 cm
**3.** 20 cm
**4.** 108 cm
**5.** 115 cm
**6.** 129 cm

**Challenge**

4 m 61 cm

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add lengths given in centimetres.

**Extension activity**

Show pupils how to add lengths given in metres and centimetres, for example:
1 m 10 cm + 2 m 28 cm = 3 m 38 cm.

Have them complete the challenge on page 97 in the Pupil's Book.

**Support activity**

Repeat the example on page 96 in the Pupil's Book for extra practice, but this time add the widths instead of the lengths. The length would stay the same and the width would be doubled.

## Lesson 6 *Pupil's Book page 97*

### Preparation

You will need to have:
- Two metres of ribbon
- Scissors
- Centimetre tape measure
- Pupil's Book

### Starter activity

Ask oral questions such as, what is:
double 40;
75 add 16;
44 plus 34;
84 and 6;
double 15;
90 minus 15;
100 take away 35;
85 take away 12;
half of 82?

### Lesson focus

Cut the two metres of ribbon in half and hold one piece up in front of the class. Tell pupils that you bought 100 cm of ribbon. You need two lots of 25 cm and two lots of 15 cm for a banner you are making. How much ribbon do you have left? Write down the key information as you say it. Repeat the problem to the class. Ask pupils how we can work out this problem.

Write their suggestions on the board including the calculations. First we need to work out how much ribbon we need:
25 cm + 25 cm = 50 cm;
15 cm + 15 cm = 30 cm;
50 cm + 30 cm = 80 cm so we need 80 cm of ribbon.

Then we can work out how much will be left:
100 cm – 80 cm = 20 cm, so we have 20 cm left.

Demonstrate by asking pupils to help measure the ribbon using the measuring tape. Measure the individual pieces and cut the ribbon. Measure the piece you are left with. Is it what they worked out?

Show pupils the second piece of ribbon measuring 100 cm. Tell them you need four pieces measuring 15 cm for a belt you are making. Do you have enough ribbon left to finish a bag you are also making which needs 35 cm of ribbon?

Ask pupils how to solve this problem. Write their workings on the board as they suggest ideas, such as: 15 cm + 15 cm + 15 cm + 15 cm = 60 cm; 100 cm – 60 cm = 40 cm. There are 40 cm of ribbon left so there is enough to use 35 cm on the bag.

Ask pupils to complete Exercise 8 (Pupil's Book page 97). Remind them to read the questions carefully and work out which calculations are needed. They must show all their working to show how they reach their answers.

### Answers

**Exercise 8**

**1.** 85 cm
**2.** 115 cm
**3.** 5 m
**4.** 8 m
**5.** Teacher to check answers.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve word stories involving length.

**Extension activity**

Read out to pupils the following problem to solve and ask them to write down the key information as you read it, and then solve the problem.

I have five planks of wood each measuring 100 cm. To make my bookcase I need two planks measuring 100 cm long for the sides, and three shelves measuring 60 cm each. What measurements of wood am I left with?

**Support activity**
Allow pupils to work in pairs for the exercise to encourage mathematical thinking, as talking through a problem helps thinking. Monitor those pupils who are struggling with length word stories and help them interpret the questions – ask them questions about what the question is asking in order to stimulate their thinking.

## Revision lesson for Unit 23

*Pupil's Book pages 92–97; Workbook page 36*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 23:
- Measuring the length and/or width of room, table, building and straight-edged materials.
- Adding lengths.
- Solving given problems involving measurement of length and/or width.
- Mentioning the importance/benefit of standard units of measurement.

Make sure that pupils are familiar with the key word definitions for this unit:
- *accurate*: correct and exact
- *standard:* standard measures are the same everywhere in the world
- *centimetre:* a unit for measuring length, equal to one hundredth of a metre
- *abbreviate:* to shorten
- *metre*: a unit for measuring length, equal to a hundred centimetres

Complete Worksheet 23 (Workbook page 36).

### Answers

**Worksheet 23**

**1.** **a)** 4 cm
**b)** 4,4 cm
**c)** 1,5 cm
**d)** 1,5 cm
**e)** 1,5 cm
**f)** 10,4 cm

**2.** Teacher to check measurements.

**3.** A – 9,3 cm; B – 4,2 cm; C – 11,3 cm; D – 7,3 cm
**a)** C, 11,3 cm
**b)** B, 4,2 cm
**c)** 7,1 cm
**d)** 7,1 cm

**Assessment**
Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to measure, compare, estimate and add measurements given in centimetres and metres.

# Unit 24 Perimeter

**Objectives**

By the end of this unit, pupils will be able to:

- Find perimeters of regular figures in metres and centimetres by measurement.
- Identify perimeters of regular shapes in their environment.

## Suggested resources

You will need to have:

- Rulers
- Pupil's Book
- Workbook

## Key word definitions

*perimeter:* the total distance around a shape or object
*rectangle:* a shape with four sides and two pairs of opposite sides equal in length
*breadth:* the width of a shape or object
*square:* a shape with four sides which are all the same length
*triangle:* a shape with three straight sides

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to have an understanding of 2-D shapes and be able to accurately measure the sides of shapes. They also need to be able to add lengths given in centimetres.

## Common errors pupils make

Pupils may make measurement errors when using centimetre rulers incorrectly – makes sure they place the edge of the ruler at the edge of the object being measured. They may also make errors when adding lengths, and they may forget to include the units.

## Evaluation guide

Assess whether pupils can:

- Find perimeters of given figures by measurement.

## Lesson 1 *Pupil's Book page 98*

### Preparation

You will need to have:

- Rulers
- Pupil's Book

### Starter activity

Draw a rectangle on the board and ask pupils to mention objects in the class which have the shape (books, desks, cupboards, etc.). Ask a pupil to use a ruler to measure the length and breadth of a table or desk. Ask the pupils if they can tell you the measurement around the top of the table. Guide them to realise that they will have to measure the length, breadth, length and then breadth to go all the way around. Explain that the distance around a shape is called its perimeter.

### Lesson focus

Ask pupils to draw a rectangle 4 cm × 6 cm in their books. Mark the vertices A, B, C and D. Ask pupils to measure AB, BC, CD and AD.

Ask pupils to add all their values together. The sum is the perimeter of the shape. AB = 6 cm, BC = 4 cm, CD = 6 cm, DA = 4 cm.
Total distance = 6 cm + 4 cm + 6 cm + 4 cm
= 10 cm + 10 cm = 20 cm.
So perimeter = 20 cm.

Work through the example on page 98 in the Pupil's Book. Pupils can complete Exercise 1 on page 98 in the Pupil's Book.

### Answers

**Exercise 1**

**1.** 6 cm
**2.** 12 cm
**3.** 4 cm
**4.** 8 cm
**5.** 20 cm
**6.** perimeter

**Homework**

Teacher to check that measurements are reasonable and perimeter calculated correctly.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to find the perimeter of a rectangle by measurement and adding together the lengths and breadths.

**Support activity**

Ask pupils to draw three different-sized rectangles in their exercise books and practise measuring lengths and breadths of rectangles and working out their perimeters.

**Homework activity**

Ask pupils to measure the lengths and breadths and work out the perimeters of some rectangular objects at home.

## Lesson 2 *Pupil's Book page 99*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask pupils to work out the perimeter of the classroom – they can decide which method to use to measure the length and breadth of the classroom, and then work it out in small groups.

### Lesson focus

Draw a square on the board with side length 6 cm and ask four pupils to come up and each measure one side. They should find that the sides are four equal lengths. Ask them to work out the perimeter of the square. This is four groups of the number measured. Therefore if the length of one side of a square is 6 cm then the perimeter is 4 × 6 cm = 6 cm + 6 cm + 6 cm + 6 cm = 24 cm

Explain that pupils can use repeated addition or multiplication to find the perimeter of a square.

Work through the example on page 99 in the Pupil's Book and complete Exercise 2.

### Answers

**Exercise 2**

**1.** 20 cm
**2.** 24 cm
**3.** 10 cm
**4.** 32 cm
**5.** 28 cm
**6.** 13 cm

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to find the perimeter of a square.

**Extension activity**

Tell pupils that the perimeter of a square is 28 cm and ask them to find the length of a side. Repeat for squares with perimeter of 12 cm, 32 cm, 40 cm and 1 m.

## Lesson 3 *Pupil's Book page 100*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Practise adding three one-digit numbers, such as:
8 + 7 + 2;
3 + 5 + 9;
1 + 4 + 6.

### Lesson focus

Draw a triangle on the board and ask pupils to come forward and measure its three sides, and then to find the perimeter. Explain that a triangle is a shape with three sides, which may be three different lengths, so they will need to add three numbers in order to find the perimeter.

Do the example on page 100 in the Pupil's Book and then complete Exercise 3 (page 100 in Pupil's Book).

### Answers

**Exercise 3**

**1.** 4 cm + 5 cm + 3,5 cm = 12,5 cm
**2.** 3 cm + 4 cm + 3,1 cm = 10,1 cm
**3.** 1 cm + 3,5 cm + 3,5 cm = 8 cm

**Challenge**

10,1 cm

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to find the perimeter of triangles by measuring and adding the side lengths.

**Extension activity**

Pupils can complete the challenge on page 100 in the Pupil's Book

**Support activity**

Draw a variety of shapes (rectangles, triangles, squares) on the board and ask pupils to come forward and measure their sides and work out the perimeters.

## Lesson 4 *Pupil's Book page 101*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Draw three rectangles with different dimensions on the board, such as 5 cm by 6 cm, 4 cm by 8 cm and 6 cm by 7 cm and ask pupils to estimate which rectangle has the longest perimeter. Now ask them to come and measure the dimensions of the three rectangles and work out the perimeters to check their estimates.

### Lesson focus

Ask pupils to imagine that they are designing a poster using a piece of cardboard of length 80 cm and width 60 cm. They decide to use ribbon to form a border around the edge of the poster – how much ribbon would they need? They should tell you that they need to work out the perimeter of the poster.

Ask them to first draw a diagram to illustrate the problem and then to work out the required length of ribbon (280 cm or 2 m 80 cm).

Read through the questions found in Exercise 4 on page 101 in the Pupil's Book, guiding the pupils to translate the problems into correct diagrams before completing the exercise.

### Answers

**Exercise 4**

**1.** 150 m
**2.** 340 m
**3.** 120 cm (or 1 m 20 cm)
**4.** 256 cm (or 2 m 56 cm)
**5.** 4 m

**Challenge**

A hexagon

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to solve given word problems involving perimeter.

**Extension activity**

Pupils can complete the challenge on page 101 in the Pupil's Book.

**Support activity**

Give pupils extra word stories and work through them slowly together:
What length of fence would be needed to fence a field 85 m by 62 m?
You bake a square cake with a side length of 20 cm. How much ribbon would you need to form a border around the outside of the cake?

## Revision lesson for Unit 24

*Pupil's Book pages 98–101; Workbook page 38*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 24:
- Finding perimeters of regular figures in metres and centimetres by measurement.
- Identifying perimeters of regular shapes in their environment.

Make sure that pupils are familiar with the key word definitions for this unit:
- *perimeter:* the total distance around a shape or object
- *rectangle:* a shape with four sides and two pairs of opposite sides equal in length
- *breadth:* the width of a shape or object
- *square:* a shape with four sides which are all the same length
- *triangle:* a shape with three straight sides

Complete Worksheet 24 (Workbook page 38).

### Answers

**Worksheet 24**

**1.** **a)** 16.5 cm
**b)** 16 cm
**c)** 15.6 cm
**d)** 21.4 cm
**e)** 21.2 cm
**f)** 17.5 cm

**2.** **a)** Teacher to check drawing, perimeter 15 cm.
**b)** Teacher to check drawing, perimeter 24 cm.
**c)** Teacher to check drawing, perimeter 20 cm.

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to find the perimeter of given shapes (rectangles, square and triangles) by measuring and adding the lengths and breadths.

# Unit 25 Time

**Objectives**

By the end of this unit, pupils will be able to:

- Say time accurately in hours and minutes.
- Mention the importance of time in daily activities.

## Suggested resources

You will need to have:

- Analogue and digital clocks
- Small clock faces with hands that can rotate
- Calendar
- Pupil's Book
- Workbook

## Key word definitions

*hour:* a unit of time made up of 60 minutes
*minute:* a unit of time made up of 60 seconds
*half past:* 30 minutes after the hour
*quarter past:* 15 minutes after the hour
*quarter to:* 15 minutes before the hour

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be able to tell the time to the hour and half hour on both analogue and digital clocks. Pupils need to know the days of the week and months of the year in order and need to know how to write the date.

## Common errors pupils make

Pupils can confuse the time when writing a 'quarter to' time in digital format. For example, if you ask pupils to write the time quarter to 6 in digital time, they may write 6.45 instead of 5.45 as 6 is the hour they heard or read. Remind them to think about the time carefully before they write it.

## Evaluation guide

Assess whether pupils can:

- Work exercises on how to tell time in minutes and hours.
- Draw clock faces to show different times.

## Lesson 1 *Pupil's Book page 102*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask pupils questions to get them talking about time, such as: What time do you wake up in the morning? What time do you get to school? What time do you have lunch? What time do you go home from school? What time do you go to bed at night?

### Lesson focus

Have a class discussion about how time is divided. Ask pupils if they know how many hours are in a day (24) and how many minutes are in an hour (60). Now ask them how many minutes are in half an hour (30).

Use a clock and point out the hour and minute hands. It takes one hour for the minute hand (the long hand) to move all the way around the clock, from 12 back to 12, and for the hour hand (the short hand) to move from one number to the next. Ask pupils if they can show you how to represent a few hour and half hour times on the clock, such as:
2 o'clock;
half past four;
10 o'clock;
half past twelve.

Now show them a few different times, all hours and half hours, and ask them what the time is. They should be familiar with hours and half hours and be able to answer these questions fairly easily.

Work through the example on page 102 in the Pupil's Book and ask pupils to complete Exercise 1 (Pupil's Book page 102).

### Answers

**Exercise 1**

1. 6 o'clock
2. 2 o'clock
3. half past one
4. half past nine

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to tell the time accurately in hours and half hours.

**Extension activity**

Introduce pupils to a digital clock and ask them if they can show these digital times on an analogue clock: 15:30; 8:00; 6:30; 21:00.

**Support activity**

If pupils need extra assistance in telling the time, draw different clocks on the board. Let them identify the hour or half hour time shown. Then draw blank clocks and ask them to come and add in the hour and minute hands to show the times, such as 3 o'clock, half past 5, etc.

## Lesson 2 *Pupil's Book page 103*

### Preparation

You will need to have:

- Large clear analogue clock
- Small clock faces with hands that can rotate
- Pupil's Book.

### Starter activity

Recap telling the time to the hour and half hour. Hold the large analogue clock up in front of the class. Set the time to an o'clock or half past time. Ask pupils to tell the time. Repeat with other o'clock or half past times.

### Lesson focus

Set the clock to quarter past eight. Ask if any pupils can work out what this time is. Remind them that when the minute hand travels half way round the clock it is half past. So how far has this minute hand travelled? It is quarter of the way round, quarter past the hour. The hour hand is just past the 8 so the time is quarter past eight. To make the introduction to quarters clear, draw a circle on the board and quarter it.

Write in the numbers 12, 3, 6 and 9 in the right places for a clock. Explain that when the hand has gone a quarter of the way round it is a quarter past the hour. Give out the small clock faces – either one each or one between two – and ask pupils to set the time to quarter past 5. Check to make sure that pupils have both hands in the right positions on their clocks. Repeat with quarter past 6, 3, 9, 11, 2 and 12.

Set the big analogue clock to quarter to 5. Tell pupils that we don't call this three quarters past the hour. When we use these clocks, after the minute hand reaches half past we then look at how many minutes until the next hour. So if we look at this clock there is only a quarter of an hour until the next o'clock so we say the time is quarter to the hour. The hour hand is heading towards the 5 and so the time is a quarter to 5.

Ask pupils to set their clocks to a quarter to 10. Check to make sure that they have both hands in the right positions on their clocks. The hour hands should be near the 10 but not on it yet. Repeat with quarter to 2, 6, 8, 1, 11 and 4.

Work through the examples on page 103 in the Pupil's Book. Pupils should complete Exercise 2 (Pupil's Book page 103).

### Answers

**Exercise 2**

Teacher to check that clocks are correctly drawn.

**Assessment**

Listen to pupils' responses throughout the lesson. Continually question pupils to consolidate and check understanding. Pupils should be able to tell the time as shown on an analogue to the hour, half hour and quarter hour.

**Extension activity**

Pupils can complete the puzzle on page 103 in the Pupil's Book (45 minutes, $\frac{3}{4}$ or $\frac{45}{60}$)

**Support activity**

Ask pupils to make a clock face and divide it into quarters. Write the minute intervals 15, 30, 45, 00 on the quarter lines. Colour the right half one colour and the left half another to help them see the difference between 'past' and 'to'.

## Lesson 3 *Pupil's Book page 104*

### Preparation

You will need to have:
Large clear analogue clock
Small clock faces with hands that can rotate
Pupil's Book

### Starter activity

Recap work covered by previous lesson – quarter past and quarter to the hour. Give out the small clocks and ask pupils to show different times.

### Lesson focus

Draw a large analogue clock face on the board and ask pupils to write in the numbers 1 to 12 on the clock. Remind them that these numbers represent the hours, when the hour hand points to them. Ask: What do they mean when the minutes hand points to them? Draw a pointer to represent the minutes' hand pointing to the number 1. Remind them that there are 60 minutes in every hour, so each of these numbers represents 5 minutes. Count round the clock in fives to show that a complete turn is 60 minutes.

Write the numbers for multiples of 5, from 5 to 60, in a different colour round the clock, and tell the pupils that these numbers tell you the numbers of minutes past the hour. Explain that times after half past can also be told as minutes to the hour. If the minute hand is on the 2, how many minutes past or minutes to is it? (10 to the hour.) If the minute hand is on the 8, how many minutes past or minutes to the hour is it? (20 to the hour.) Repeat with different numbers of minutes.

Draw an hour hand pointing towards the 5 and the minute hand on the 1. What time does this clock say? (5 minutes past 5.) Where would the hands be if the time was 25 minutes to 3? (The minute hand on the 7 and the hour hand halfway between the 2 and the 3.)

Give out the small clocks and ask pupils to show the times: 10 minutes past 4; 20 minutes past 9; 20 minutes to 7; 5 minutes to 12.

Work through the examples on page 104 in the Pupil's Book and ask pupils to complete Exercise 3.

### Answers

**Exercise 3**

**1.** 5
**2.** 10
**3.** 15
**4.** 30
**5.** 45
**6.** 20
**7.** 55
**8.** 25
**9.** 40
**10.** 35
**11.** 50
**12.** 60

**Homework**

Teacher to check.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to tell the time as shown on an analogue clock to the hour, half hour and quarter hour, extended to minutes past and minutes to.

**Homework activity**

Ask pupils to draw six analogue clock faces and draw on these times:
5 minutes past 2;
25 minutes past 8;
5 minutes to 3;
25 minutes to 7;
10 minutes to 12.

**Support activity**

Give pupils extra practice with the small clocks, asking them to show you various times using minutes, and showing them various times and asking them what time it is.

## Lesson 4 *Pupil's Book page 105*

### Preparation

You will need to have:

- Large clear analogue clock
- Small clock faces with hands that can rotate
- Pupil's Book

### Starter activity

Count in fives from 0 to 60 and back. Recap on the introduction to 5 minute intervals given in the previous lesson. Hand out small clocks and ask pupils to show a variety of times of minutes past and minutes to.

### Lesson focus

Ensure that you have looked at the answers to the homework from the previous lesson to see how much needs to be looked at again. If pupils have found it challenging, now is the time to go over it again.

Particularly focus on 'minutes to' as some pupils may struggle with this concept.

Complete Exercises 4 and 5 on page 105 of the Pupil's Book.

### Answers

**Exercise 4**

**1.** 5 to 6
**2.** 25 past 2
**3.** 20 to 7
**4.** half past 6

**Exercise 5**

Teacher to check that clocks are correctly drawn.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to tell the time as shown on an analogue clock to the hour, half hour and quarter hour, extended to telling the time to minutes past and minutes to.

**Extension activity**

Pupils can complete the challenge in the Pupil's Book on page 105. (1 440 minutes)

**Support activity**

Allow pupils to use the small clock faces to help them complete Exercise 5. Spend time helping those who are struggling, particularly with 'minutes to', making sure that can correctly answer questions and that they do not confuse 'minutes to' and 'minutes past'.

## Revision lesson for Unit 25

*Pupil's Book pages 102–105; Workbook page 40*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 25:
- Say time accurately in hours and minutes.
- Mention the importance of time in daily activities.

Make sure that pupils are familiar with the key word definitions for this unit:
- *hour:* a unit of time made up of 60 minutes
- *minute:* a unit of time made up of 60 seconds
- *half past:* 30 minutes after the hour
- *quarter past:* 15 minutes after the hour
- *quarter to:* 15 minutes before the hour

Complete Worksheet 25 (Workbook page 40).

### Answers

**Worksheet 25**

**1.** **a)** 7 o'clock
**b)** half past 8
**c)** 5 past 11
**d)** quarter past 12
**e)** quarter to 9
**f)** 20 past 7

**2.** Teacher to check times are correctly filled in.

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to work exercises on how to tell time in minutes and hours and draw clock faces to show different times.

# Unit 26 Calendars

**Objectives**

By the end of this unit, pupils will be able to:

- Give dates in day and month.

## Suggested resources

You will need to have:

- Calendar
- Local history books
- Pupil's Book
- Workbook

## Key word definitions

*calendar:* a chart that shows the days, weeks and months of the year

*leap year:* a year once every four years that has 366 days

*celebration:* a special event

*religious festivals:* a time when religions celebrate important events

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils should be able to name the days of the week and the months of the year. They should be able to write the date.

## Evaluation guide

Assess whether pupils can:

- Demonstrate the ability to read a calendar and state the date of a particular event in Nigeria.
- Say the number of days in any given month and the number of months in a year.

## Lesson 1 *Pupil's Book page 106*

### Preparation

You will need to have:

- Calendar
- Pupil's Book

### Starter activity

Ask pupils to recite the days of the week and months of the year. Ask pupils quick-fire questions, such as: Which month comes after April? Which month is before November? Which month is after December? Which day of the week is after Tuesday? Which day of the week is before Saturday? And so on. Refer them to a copy of a calendar, if necessary.

### Lesson focus

Explain that today you are going to be looking at days and weeks using calendars. Look together as a class at a wall calendar or write out the days of the week on the board. Point to the day Tuesday. Ask pupils to look at the days of the week and say what day it would be six days later. Tell pupils to count on from Tuesday as if they were counting on a number line. The answer is Monday. Point to different days of the week and ask pupils to count on 2, 3, 4, 5, 6 and 7 days.

Show the class the wall calendar. Circle a date, for example, March 6. Ask pupils what they think the date will be in one week's time? (March 13) two weeks' time? (March 20) three weeks' one time? (March 27) 1 months' time? (April 6). Choose a different month and date to start from.

Ask the class how many days are in a particular month, such as March, September and December. They can use the calendar to help them if they are not sure. Ask them questions such as: how many Fridays are there in July?

Ask pupils to complete Exercises 1 and 2 on pages 106 and 107 in the Pupil's Book.

### Answers

**Exercise 1**

**1.** Wednesday 1 January
**2.** Wednesday 31 December
**3.** Thursday
**4.** 31 days
**5.** four
**6.** 6th, 13th, 20th, 27th
**7.** Monday
**8.** 12 June
**9.** Wednesday
**10.** They are weekend days.
**11.** Wednesday 15 January
**12.** Sunday
**13.** Friday
**14.** Teacher to check answers.

**Exercise 2**

**1.** 48 hours
**2.** 168 hours
**3.** 672 hours

**Puzzle**

212 days

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to say the days of the week, the number of days in any given month and read a calendar.

**Extension activity**

Pupils can complete the puzzle on page 107 in the Pupil's Book.

**Support activity**

Spend time practising the days of the week and the months of the year with those who need it.

## Lesson 2 *Pupil's Book page 107*

### Preparation

You will need to have:

- Calendar
- Pupil's Book

### Starter activity

Ask pupils to recite the days of the week and months of the year. Ask pupils quick-fire questions, such as: Which month comes after March? Which month is before October? Which month is after May? Which day of the week is before Thursday? Which day of the week is after Saturday?

### Lesson focus

Ask pupils to recite the months of the year, and talk about how many days are in each month. Ask them questions using a calendar, for example, what is the name of the fifth month? Which month comes after August? Which month is between February and April? Which month is three months after May? Point to May on the chart or board and, as a class, count on three months. The answer is August. Point to January and say: We start a new topic at the beginning of January and we finish it in the beginning of March. How long did we look at this topic for? (2 months)

Complete Exercises 3 and 4 on page 107 and 108 in the Pupil's Book.

### Answers

**Exercise 3**

**1.** 12
**2.** March
**3.** June
**4.** November
**5.** July
**6.** May
**7.** January, March, May, July, August, October, December. 217 days.
**8.** April, June, September, November. 120 days
**9.** 28 days
**10.** 365 days
**11.** 52 weeks

**Exercise 4**

**1.** September
**2.** March

**Homework**

Teacher to check and ensure pupils can record dates accurately.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to say the months of the year, the number of days in any given month and read a calendar.

**Homework activity**

Ask pupils to find out the dates of birth of their family and friends.

**Support activity**

Write the months of the year horizontally, along a number line, to help pupils work out answers to questions such as: Which month is three months after April? (July) Which month is two months before March? (January)

## Lesson 3 *Pupil's Book page 109*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask pupils to write down the dates of any special days they know of, including their birthdays, family members birthdays, public holidays, special events etc.

### Lesson focus

Ask pupils which is the shortest month in the year? (February). How many days are there in February? (Most will say 28, some may say 29). Explain that every fourth year there are 29 days in February, and this is called a leap year. A leap year has 366 days.

Use the calendar to show pupils how to identify whether a year is a leap year or not – in a year which is not a leap year, the first and last day of the year fall on the same day (for example Wednesday as in the calendar on page 106 in the Pupil's Book). Tell pupils when the last leap year was, and ask when the next leap year will be.
Also discuss that a calendar shows us special days and events, such as days of national celebration, religious festivals and important family days. Talk about the starter activity and combine pupils' lists of special national days and celebrations to form a list of important Nigerian days.

Instruct the pupils to colour the following dates in blue on the calendar on page 106 in the Pupil's Book: Wed 1 January; Fri 18 April; Mon 21 April; Wed 1 October; Sun 5 October; Thurs 25 December.

Complete Exercise 5 on page 109 in the Pupil's Book.

### Answers

**Exercise 5**

1. It is a public holiday in Nigeria – Independence Day.
2. 5 October – Eid al Adha (2014 only)
3. 25 December
4. For 2014 – 18 to 21 April
5. Different answer depending on the pupil's birthday.

**Extension**

52 weeks

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to demonstrate the ability to read a calendar and state the date of a particular event in Nigeria; understand leap years.

**Extension activity**

Pupils can complete the puzzle on page 109.

## Revision lesson for Unit 26

*Pupil's Book pages 106–109; Workbook page 41*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 26:
- Giving dates in day and month.
- Reading a calendar.
- Leap years and special days in Nigeria.

Make sure that pupils are familiar with the key word definitions for this unit:
- *calendar:* a chart that shows the days, weeks and months of the year
- *leap year:* a year once every four years that has 366 days
- *celebration:* a special event
- *religious festivals:* a time when religions celebrate important events

Complete Worksheet 26 (Workbook page 41).

### Answers

**Worksheet 26**

**1.** Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday

**2.** January, February, March, April, May, June, July, August, September, October, November, December

**3.** **a)** 30
**b)** 31
**c)** 28/29
**d)** 30

**4.** Teacher to check.

**5.** Teacher to check, answers will vary depending on the year.

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to demonstrate the ability to read a calendar and state the date of a particular event in Nigeria and say the number of days in any given month and the number of months in a year.

# Unit 27 Measuring and comparing weights

**Objectives**

By the end of this unit, pupils will be able to:

- Measure weight of objects in grams and kilograms.
- Make meaningful comparison of weights of objects like rocks and minerals.
- Appreciate the need for grams and kilograms as standard units of measure.

## Suggested resources

You will need to have:

- Beam balance
- Pan scales
- Kitchen scales
- Bathroom scales
- Spring balance
- Kilogram weights
- Gram weights: 1 g, 2 g, 5 g, 10 g, 50 g, 100 g
- Variety of objects to weigh including: bricks, books, satchel, pot of pencils, potatoes, mug, card, bowl, shoe, small rocks, bunch of bananas, pot of erasers, ten crayons
- Pupil's Book
- Workbook

## Key word definitions

*weight:* a measure of how heavy an object is
*heavy:* a heavy object has a great weight
*kilograms:* a unit used to measure the weight of heavier objects
*grams:* a unit used to measure the weight of lighter objects
*light:* a light object has a small weight
*scale:* an instrument used to measure weight

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to be able to work with numbers to 100 and beyond. Pupils need to be able to compare measures, saying which is more and which is less. Pupils need to know that the standard units we use for measuring mass are grams and kilograms.

## Common errors pupils make

Pupils must make sure the balances are level before using them, as this obviously would affect the measuring.

## Evaluation guide

Assess whether pupils can:

- Weight selected objects and make a chart of their results.
- Give examples of objects in the classroom and at home whose weight could be expressed in grams or kilograms.
- Determine the weight of given rocks and minerals and explain those that can be expressed in grams and kilograms.

## Lesson 1 *Pupil's Book page 110*

### Preparation

You will need to have:

- Kilogram weights
- Gram weights: 1 g, 2 g, 5 g, 10 g, 50 g, 100 g
- Variety of objects such as pencils, books, coins, bunch of bananas, packet of sweets, etc.
- Pupil's Book

### Starter activity

Collect together a variety of objects ranging from a few grams to a few kilograms in mass. Hold up a kilogram weight. Tell pupils that they are going to sort the objects into those that are less than a kilogram and those which are more. Ask one pupil at a time to compare an object with the kilogram weight, just by holding one in each hand and then placing the object into either the more than or less than one kilogram group. Question any errors being made. Does the class agree with each pupil's choice?

### Lesson focus

Explain what weight is to your pupils and that we usually use grams and kilograms to measure weight. We use grams to measure objects which are light, and kilograms to measure heavier objects. Ask pupils to think of objects they would measure in grams and kilograms. Now show them a few objects and ask them what unit they would use to weigh them (such as a pencil, chair, book, coin, a pupil, box of books, a bunch of bananas, a packet of sweets, etc.).

Now show them various weights – 1 kg, 500 g, 250 g, etc. Allow pupils to hold the weights and use them to estimate the weight of various objects, such as the ones listed above.

Complete Exercise 1 on page 110 in the Pupil's Book.

### Answers

**Exercise 1**

1. kilograms
2. grams
3. kilograms
4. grams
5. grams
6. kilograms

**Homework**

Check that the pupils are able to reproduce labels showing kilograms and grams, and that they can identify the heaviest and lightest.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to decide whether grams or kilograms are appropriate to measure the weight of given items.

**Homework activity**

Ask pupils to find packages and labels with gram or kilogram weights on and to draw them in their books. What is the heaviest package they can find and what is the lightest package they can find?

## Lesson 2 *Pupil's Book page 111*

### Preparation

You will need to have:

- Beam balance
- Pan scales
- Kitchen scales
- Spring balance
- Bag of flour
- Pupil's Book

### Starter activity

Ask pupils to look at each of the different types of scales and balances. Go through each one and say what it is called and ask a pupil to come to the front and demonstrate how it works.

### Lesson focus

Use the starter activity to explain that there are different types of scales used to measure the weight of an object.

Hold up a bag of flour and show pupils how to weight it using the different types of scales and balances. They should see that the weight is the same on all the different scales (assuming they are all accurate). Now allow pupils to come forward in small groups and weight a variety of objects, using the different scales. Check that they can accurately read the weight off the scales or balances. Ask them questions like: What do we need to do before we start weighing? How do we know when the scales are balanced?

Complete Exercise 2 on page 111 in the Pupil's Book.

### Answers

**Exercise 2**

**1.** 30 kg
**2.** 10 kg
**3.** 200 g
**4.** 125 g
**5.** 350 g
**6.** 50 g

**Puzzle**

**a)** half;
**b)** quarter;
**c)** whole;
**d)** three quarters

**Challenge**

**a)** 6 kg 750 g;
**b)** 13 kg 865 g;
**c)** 13 kg 172 g

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to read weights accurately off different types of scales and balances.

**Extension activity**

Pupils can complete the challenge and the puzzle on page 111 in the Pupil's Book.

**Support activity**

When pupils are using the scales and balances, walk round and observe their methods.
Steer them away from errors by questioning them: What do we need to do before we start weighing? How do we know when the scales are balanced? Make sure they are able to read weights of all the different scales and balances, giving them as much guidance as necessary.

## Lesson 3 *Pupil's Book page 112*

### Preparation

You will need to have:

- Beam balance
- Pan scales
- Bathroom scales
- Spring balance
- Kilogram weights
- Variety of objects to weigh including: pencils, coins, sweets, eraser, bricks, books, satchel, potatoes
- Pupil's Book

### Starter activity

Go through each of the scales and balances again to ensure that pupils know how to use them correctly. Ask pupils to explain what to do. Ask one pupil to come to the front to demonstrate.

### Lesson focus

Using a collection of objects weighing about 100 g or less, ask one pupil at a time to come to the front and choose an object and a scale or balance. Ask the class to check if balances are level before the object is weighed. Ask the pupils at the front to weigh the objects and for the class to check their measurements.

Remind pupils that we use kilograms to weigh heavier objects. One kilogram is the same as 1 000 grams. Ask one pupil to come to the front and stand on the bathroom scales. Ask another to come and read the scales. How many kilograms does the pupil weigh?

Complete Exercises 3 and 4 on page 112 in the Pupil's Book.

### Answers

**Exercise 3**

Teacher to supervise and check answers.

**Exercise 4**

Teacher to supervise and check answers.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to weight a variety of objects, in grams and kilograms, using the different scales and balances.

**Extension activity**

Fill a bag with a collection of objects. Pass it round the class and ask each to write down an estimate for the mass of the bag. Weigh the bag and then find out who had the closest estimate.

**Support activity**

When pupils are using the scales and balances, walk round and observe their methods.
Steer them away from errors by questioning them: What do we need to do before we start weighing? How do we know when the scales are balanced? Make sure they are able to read weights of all the different scales and balances, giving them as much guidance as necessary.

## Lesson 4 *Pupil's Book page 113*

### Preparation

You will need to have:

- Beam balance
- Pan scales
- Bathroom scales
- Spring balance
- Kilogram weights
- Variety of objects to weigh including: pencils, coins, sweets, eraser, bricks, books, satchel, potatoes
- Pupil's Book

### Starter activity

Ask pupils how many grams there are in a kilogram. If there are 1 000 grams in 1 kilogram, how many grams are in
2 kg? (2000)
3 kg? (3000)
half a kg? (500)
2 and a half kg? (2500)

### Lesson focus

Show pupil a variety of objects and ask them which they think is the heaviest object. Which is the lightest object? Now ask them to call out the objects in order from lightest to heaviest. Weigh each object and write them down in order of weight, checking if pupils' order was accurate.

Write a few pairs of weights on the board and ask pupils to fill in < or > to compare them:
5 kg and 8 kg;
250 g and 205 g;
00 g and 1 kg;
60 kg and 95 g.

Complete Exercise 5 on page 113 in the Pupil's Book.

### Answers

**Exercise 5**

**1.** B
**2.** D
**3.** **a)** <
**b)** >
**c)** <
**d)** <
**e)** <
**4.** **a)** lighter
**b)** heavier
**c)** lighter
**d)** lighter
**e)** heavier

**Homework activity**

**1.** <
**2.** <
**3.** >
**4.** >
**5.** >

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to compare and order weights, given in grams or kilograms.

**Homework activity**

Ask pupils to copy these weights and complete with < or >:
**1.** 50 g; 5 kg
**2.** 350 kg; 500 kg
**3.** 200 g; 102 g
**4.** 3 000 g; 1 kg
**5.** 60 kg; 250 g

**Support activity**

Guide pupils to look carefully at the units when comparing weights and not just at the numbers. It may help them to first write both weights in grams, remembering that 1 kg is 1 000 g, and then compare them. Practise converting from kilograms to grams, as in the starter activity.

## Revision lesson for Unit 27

*Pupil's Book pages 110–113; Workbook page 42*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 27:
- Measuring weight of objects in grams and kilograms.
- Making meaningful comparison of weights of objects like rocks and minerals.
- Appreciating the need for grams and kilograms as standard units of measure.

Make sure that pupils are familiar with the key word definitions for this unit:
- *weight:* a measure of how heavy an object is
- *heavy:* a heavy object has a great weight
- *kilograms:* a unit used to measure the weight of heavier objects
- *grams:* a unit used to measure the weight of lighter objects
- *light*: a light object has a small weight
- *scale:* an instrument used to measure weight

Complete Worksheet 27 (Workbook page 42).

### Answers

**Worksheet 27**

**1.** **a)** the string/wool
**b)** the book
**c)** the bag
**d)** the sack

**2.** **a)** the box of matches
**b)** the sack

**3.** Teacher to check answers.

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to weigh selected objects and make a chart of their results and give examples of objects in the classroom and at home whose weight could be expressed in grams or kilograms.

# Unit 28 Capacity

**Objectives**

By the end of this unit, pupils will be able to:

- Identify litres and millilitres as units of measuring capacity.
- Measure liquid, e.g. water, using a graduated cylinder up to any stated number of litres.
- Add and subtract capacity in litres or millilitres.
- Identify the need for accuracy in measuring liquids.

## Suggested resources

You will need to have:

- Litre jug, litre bottle
- Variety of containers including large and small bowls, large jug or pitcher, bucket, small and large bottles
- Cup, glass, mug
- Paint pot
- Spoon
- Sand or water
- A clear small tank or plastic box
- Marker pen
- Measuring jugs marked in millilitres (at least one between five)
- Pupil's Book
- Workbook

## Key word definitions

*capacity:* the amount of liquid that a container can hold

*liquid:* substances such as water, oil, kerosene, petrol, diesel, milk, drinks

*container:* an object that can be used to hold something, such as a liquid

*litres:* a measure of capacity used in everyday life

*millilitres:* a measure of capacity used for smaller amounts of liquid, such as teaspoons; there are 1 000 millilitres in a litre

*centilitre:* a measure of capacity for smaller amounts of liquid; there are 100 centilitres in a litre

*decilitre:* a measure of capacity; there are 10 decilitres in a litre

*kilolitre:* a measure of capacity used for larger amounts of liquid; there are 1 000 litres in a kilolitre

*graduated:* a graduated measure shows the capacity of a container in stages

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*

**A** Pupils need to understand that capacity is measuring how much a container can hold. Pupils need to be confident using numbers to 100 and beyond. Pupils need to know that capacity can be measured using litres as the standard unit.

## Common errors pupils make

When measuring different containers, pupils may round up or round down incorrectly when the measurements are not exact. Practise rounding figures to the nearest interval.

## Evaluation guide

Assess whether pupils can:

- Say how many millilitres and decilitres make one litre.
- Add and subtract capacities.
- Measure out a given number of litres, up to four litres, of water with a graduated cylinder.

## Lesson 1 *Pupil's Book page 114*

### Preparation

You will need to have:

- a litre bottle
- a large jug or pitcher
- a bucket
- a large bowl
- sand or water
- a clear small tank or plastic box
- marker pen
- Pupil's Book

### Starter activity

Ask pupils to work out: How many fives in ten? How many twos in eight? How many tens in one hundred? How many threes in fifteen? Use other similar questions.

### Lesson focus

Explain what capacity is and remind pupils that capacity can be measured in litres. Show pupils the litre bottle and tell them its capacity is one litre.

Ask a pupil to come to the front and choose a container from the jug, bowl and bucket. Ask him/her to fill the bottle with water (or sand) and empty it into the container they have chosen. Ask the class to help count how many times they can empty a bottle into the container until it is full.

Write on the board how many litres the container held. (Explain that the bottle holds 1 litre. If it is emptied three times to fill a container then the container holds 3 litres.) Count only whole litres to avoid complexity. Ask another two pupils, one at a time, to come up to the front and repeat the task until you have measurements for all three containers.

Ask pupils to order the capacities of the containers from least to most. Ask them to work out how many filled jugs would fill the bucket or the large bowl.

Show pupils the clear small tank or plastic box. Explain that they can make the box into a measuring container. Fill the litre bottle and empty it into the box. Use the marker pen to draw a line where the sand or water has come up to and write 1 ℓ next to it. Ask pupils one at a time to empty another litre into the box and mark and number the level. Keep going until you reach the top of the box. Now empty the contents of the box and fill up a small bucket or large jug. Pour the contents from each new container into the measuring box and ask pupils which line the contents is closest to, i.e. to find the capacity. Repeat with different containers and ask them to read the approximate measurement.

Complete Exercises 1 and 2 on page 114 in the Pupil's Book.

### Answers

**Exercise 1**

**1.** 5
**2.** 2
**3.** 5
**4.** 2

**Exercise 2**

**1.** 5 litres
**2.** 4 litres
**3.** 20 litres
**4.** 13 litres
**5.** 10 litres
**6.** 7 litres

**Homework**

Discuss the pupils' answers and ensure they are reasonable.

**Extension**

**1.** 8
**2.** 6
**3.** 7

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to measure, compare and order the capacity of containers using litres.

**Extension activity**
Ask pupils to solve:

1. How many 2-litre jugs would it take to fill a 16-litre bucket?
2. How many 5-litre buckets would it take to fill a 30-litre sink?
3. How many 3-litre bowls would it take to fill a 21-litre tank?

**Homework activity**
Ask pupils to use a litre bottle or jug to measure the capacity of a large bowl or sink in their home.

## Lesson 2 *Pupil's Book page 115*

### Preparation

You will need to have:

- Measuring jugs marked in millilitres (at least one between five)
- Small bottle, large spoon, paint pot, drinking glass and a small bowl
- Sand or water
- Small containers different to those mentioned above
- Pupil's Book

### Starter activity

Explain to pupils that when we want to measure quantities that are less than one litre, we can use the unit millilitre. Explain that one millilitre is a one thousandth of a litre – in other words there are 1 000 millilitres in a litre. Show the class the measuring jug and the millilitre markers. Look at the intervals which are shown on the measuring jug. Explain that 1 millilitre is such a small amount that it is impossible to mark every millilitre on the jug. What are the intervals used on this measuring jug?

### Lesson focus

Show the class a variety of small containers. Ask one pupil at a time to come and choose a container, fill it with water or sand and empty it into the measuring jug to see how much its capacity is. When reading the measurements, ask pupils to look to the closest interval mark. Write the measurement on the board.

Repeat until all the containers have had their capacity measured. Ask pupils to order the different capacities from smallest to greatest.

Ask pupils to complete Exercise 3 (Pupil's Book page 115). While they are working, walk around the classroom observing their answers and asking them to explain their responses.

## Answers

**Exercise 3**

**1.** 100 ml
**2.** 70 ml
**3.** 500 ml
**4.** 400 ml
**5.** 200 ml
**6.** 100 ml
**7.** A
**8.** B
**9.** C
**10.** 40 ml
**11.** D
**12.** E and C

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to measure, compare, and order the capacity of containers using millilitres.

**Extension activity**

Use empty pots or small plastic bottles for pupils to make their own measuring container. Decide on appropriate intervals to use – tens, twenty-fives, fifties or hundreds, depending on the pots or bottles being used.

**Support activity**

Work closely with pupils who need extra support, helping them to distinguish between the capacity of a jug and the amount of liquid it holds. Help them to read the amount of liquid in a jug by ensuring the jug is at eye level, instead of looking at it from an angle.

## Lesson 3 *Pupil's Book page 116*

## Preparation

You will need to have:

- Household objects such as cups, teaspoons, jugs, bucket, bowl, jug, cup, a litre bottle, soft drink bottle
- Water
- Measuring jugs and spoons
- Pupil's Book

## Starter activity

Show pupils a variety of household objects, such as a cup, teaspoon, tablespoon, bottle, jug, etc. and ask them to estimate how many millilitres or litres they each hold.

## Lesson focus

Fill the containers/objects used in the starter activity with water and pour out the water into measuring jugs/spoons to show pupils the capacity of each object.

Pupils should specifically see that a cup holds 250 ml and a teaspoon holds 5 ml. Ask them when it could be useful to know these measures (baking, cooking, administering medicines, etc.).

Complete Exercises 4 and 5 on page 116 in the Pupil's Book.

## Answers

**Exercise 4**

**1.** 4
**2.** A quarter
**3.** 125 ml
**4.** 5 ml
**5.** 15 ml
**6.** 500 ml
**7.** 3 cups

**Exercise 5**

Teacher to supervise and check answers.

**Extension**

**1.** 50
**2.** 100
**3.** 4
**4.** 20
**5.** 3
**6.** 30

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to work with household measures such as cups and teaspoons.

**Extension activity**

Ask pupils:

**1.** How many teaspoons in a cup?
**2.** How many teaspoons in two cups?
**3.** How many cups in a litre?
**4.** How many cups in five litres?
**5.** How many teaspoons in a tablespoon?
**6.** How many teaspoons in ten tablespoons?

## Lesson 4 *Pupil's Book page 117*

### Preparation

You will need to have:

- Collection of containers with capacities less than 1 litre
- Water or sand
- Measuring jug
- Card labels
- Pupil's Book

### Starter activity

Ask pupils to solve these calculations:

| | |
|---|---|
| 40 + 100 = | 48 – 34 = |
| 64 + 131 = | 77 – 12 = |
| 125 + 235 = | 150 – 25 |
| 650 + 300 = | 50 – 9 – 5 = |
| 575 + 225 = | 450 – 200 = |
| 200 + 775 = | |

### Lesson focus

Lay out a collection of containers each with a capacity less than 1 litre on a table next to a bucket of water or sand and a measuring jug. Ask a different pupil each time to come up and measure the capacity of the container. Write a label for each object saying how much it holds. Ask one pupil at a time to come and choose two containers from the table and fill them up. With the help of the class ask them to add together the capacity of the two containers. Extend with three containers. Write the total capacities each pupil has on a card label and ask the class to order the totals from least to most.

Now choose two containers and place them on the table at the front of the class. Fill the larger container with either sand or water. Pour the contents of the larger container into the smaller container until it is full.

Ask pupils: How could we find out how much is left in the larger container without measuring it? If you start with the capacity of the larger container and take away the capacity of the smaller container you will find out how much is left.

For example, if the larger container has a capacity of 350 ml and it fills a container with a capacity of 100 ml then to find out how much is left we work out 350 ml – 100 ml = 250 ml. Repeat with another two containers.

Work through the examples on page 117 in the Pupil's Book, reminding pupils of the column method used for adding and subtracting.

Complete Exercise 6 (page 117 in the Pupil's Book).

## Answers

**Exercise 6**

**1.** 178 ml
**2.** 105 ml
**3.** 83 ml
**4.** 85 l
**5.** 120 l
**6.** 60 l
**7.** 24 ml
**8.** 21 ml
**9.** 51 ml
**10.** 18 ℓ
**11.** 65 ℓ
**12.** 68 ℓ

**Extension**

**1.** 230 ml
**2.** 49 ℓ

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to add and subtract capacities in millilitres and litres.

**Extension activity**

Ask pupils to work out:
**1.** 250 ml – 28 ml + 15 ml – 7 ml
**2.** 68 ℓ + 22 ℓ – 34 ℓ + 12 ℓ – 19 ℓ

**Support activity**

Pupils may need extra support with subtracting three numbers. Show them once again how to use the column method, taking two numbers at a time. Use coloured chalks or pencils to help them distinguish between the hundreds, tens and units columns.

## Lesson 5 *Pupil's Book page 118*

## Preparation

You will need to have:
- Bucket, bowl, jug, cup, a litre bottle, soft drink bottle
- Water or sand
- Pupil's Book

## Starter activity

Explain to pupils that when we want to measure quantities that are reasonably large, we can use a litre measure. Remind pupils that 1 litre is 1000 millilitres, and these units are used when measuring something reasonably small. Hold up a range of containers, and ask pupils to tell you which units they would use to measure them.

## Lesson focus

Now tell pupils that although we mostly use millilitres and litres to measure capacity, there are other units in between which we can use. Describe to pupils how litres can be divided into other smaller units like decilitres (10 decilitres make a litre) and centilitres (100 centilitres make a litre). Work through the table in the Pupil's Book on page 118, discussing which units are smaller than a litre and larger than a litre, and how many of each unit makes up on litre.

Explain to pupils that sometimes bottle makers find it easier to use centilitres or decilitres to describe the capacity of their bottles. Some soft drink bottles, for example, have labels which say they contain 50 centilitres. Explain that, since there are 100 centilitres in every litre, then two of such bottles will contain 1 litre.

Hold up a 50 cl soft drink bottle with water in it. Pour the water into a measuring jug. Let pupils see how this is the same as 500 ml or half of a litre. Pour a second bottle in to show that the two bottles make a litre. Show the pupils other containers, labelled in either centilitres or decilitres, and let them discover how many of each of these containers is the same as a litre.

Once pupils are familiar with centilitres, decilitres and kilolitres as other units for capacity. Ask pupils questions such as:
How many centilitres in a litre? Two litres? Three litres?
How many decilitres in a litre? Five litres? Ten litres?
How many litres in a kilolitre? Two kilolitres? Five kilolitres?
How many millilitres in a centilitre? Two centilitres? How many centilitres in a decilitre?

Complete Exercise 7 on page 118 in the Pupil's Book.

## Answers

**Exercise 7**

**1.** 2
**2.** 4
**3.** 10
**4.** 100
**5.** No

**Challenge**

1 litre and 258 ml

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to say how many millilitres, centilitres and decilitres make one litre, and how many litres make up one kilolitre.

**Extension activity**

Pupils can complete the challenge on page 118 in the Pupil's Book.

**Support activity**

Revise multiplying and dividing by ten, one hundred and one thousand to help pupils who are struggling to convert between units. Use questions such as:

| | |
|---|---|
| 3 × 10 | 2 000 ÷ 10 |
| 3 × 100 | 2 000 ÷ 100 |
| 3 × 1 000 | 2 000 ÷ 1 000 |

## Lesson 6 *Pupil's Book page 119*

## Preparation

You will need to have:

- Variety of jugs and containers with graduated measure
- Pupil's Book

## Starter activity

Show pupils a variety of jugs with graduated measure, each containing water, and ask them: What is the capacity of the jug? How much water is in the jug? How much water should I add to fill the jug to capacity?

## Lesson focus

A graduated measure is one that shows the capacity of a container in stages. Hold up a measuring jug with graduated measure and ask pupils what steps the measures go up in. Repeat with different measuring jugs. Ask pupils why this is useful – so that we can tell how much liquid a jug contains, even when it is not full to capacity; so we can measure different amounts of liquids etc. Talk about when this is useful in everyday life, including examples such as baking and cooking; medicines; measuring petrol and diesel; water tanks etc.

Hold up a two measuring jugs, one smaller than the other. Fill the smaller jug to capacity, and ask pupils what level the water will reach if you pour it into the bigger jug. Pour the water and mark the level it reaches. Ask pupils how much more water is needed to fill the bigger jug.

Complete Exercise 8 on page 119 in the Pupil's Book.

## Answers

**Exercise 8**

**1.** Check that jug is copied correctly.
**2.** Teacher to check blue mark.
**3.** Teacher to check yellow mark.
**4.** 3 ℓ and 65 ml are needed. You can use the jug, the plastic bottle and the glass bottle.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to use a graduated measure to measure liquids.

**Extension activity**

Pupils can complete the puzzle on page 119 in the Pupil's Book. (Fill up the 20-litre jug; pour out enough water to fill the 7-litre jug; discard this water and repeat. What is left in the 20-litre jug is 6 litres.)

**Support activity**

Have pupils practise pouring water from between different-sized measuring jugs, reading off the levels of water each time and working out how much water is needed to fill the jug.

## Revision lesson for Unit 28

*Pupil's Book pages 114–119; Workbook page 43*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 28:

- Identifying litres and millilitres as units of measuring capacity.
- Measuring liquid, e.g. water, using a graduated cylinder up to any stated number of litres.
- Adding and subtracting capacity in litres or millilitres.
- Identifying the need for accuracy in measuring liquids.

Make sure that pupils are familiar with the key word definitions for this unit:

- *capacity:* the amount of liquid that a container can hold
- *liquid:* substances such as water, oil, kerosene, petrol, diesel, milk, drinks
- *container:* an object that can be used to hold something, such as a liquid
- *litres:* a measure of capacity used in everyday life
- *millilitres:* a measure of capacity used for smaller amounts of liquid, such as teaspoons; there are 1 000 millilitres in a litre
- *centilitre*: a measure of capacity for smaller amounts of liquid; there are 100 centilitres in a litre
- *decilitre:* a measure of capacity; there are 10 decilitres in a litre
- *kilolitre:* a measure of capacity used for larger amounts of liquid; there are 1 000 litres in a kilolitre
- *graduated:* a graduated measure shows the capacity of a container in stages

Complete Worksheet 28 (Workbook page 43).

### Answers

**Worksheet 28**

**1.** The amount of liquid it can hold.

**2.** **a)** 1 000
**b)** 1 000
**c)** 5
**d)** 250
**e)** 125

**3.** **a)** litres
**b)** kilolitres
**c)** millilitres
**d)** litres
**e)** centilitres

**4.** Teacher to check drawing.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to say how many millilitres, centilitres and decilitres make one litre; add and subtract capacities; measure out a given number of litres, up to four litres, of water with a graduated cylinder.

# Unit 29 Straight lines and curves

**Objectives**

By the end of this unit, pupils will be able to:

- Distinguish between curves and straight lines.
- Measure straight lines and curved lines.
- Identify the presence of straight lines and curves in real life situations.

## Suggested resources

You will need to have:

- Objects with straight and curved edges like duster, bucket, table
- Map
- Magazines
- Rulers
- String
- Pupil's Book
- Workbook

## Key word definitions

*straight:* a straight line can be drawn with a ruler
*curved:* a curved line cannot be drawn with a ruler

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to draw lines using a ruler. They should be able to accurately use a ruler to measure lines.

## Common errors pupils make

Pupils may try to use a ruler to measure a curved line by either measuring end to end, or by twisting the ruler as they go. Show them how the first method leads to an inaccurate answer, and how although the second method may give an approximation of the length, it is more accurate to use something flexible like string to measure a curved line.

## Evaluation guide

Assess whether pupils can:

- Explain the difference between a straight line and a curve.
- Measure straight and curved lines.
- Identify everyday examples of straight lines and curves.

## Lesson 1 *Pupil's Book page 120*

### Preparation

You will need to have:

- Objects with straight and curved edges like duster, bucket, table
- Map
- Magazines
- Pupil's Book

### Starter activity

Practise measuring using a ruler – draw a number of straight lines on the board and ask a few pupils to come up and measure them using a ruler. Ask other pupils to come and check their measurements. Discuss how to use a ruler accurately to measure a straight line, making sure the line is measured from end to end and the ruler is placed correctly.

### Lesson focus

Show the pupil the objects with straight and curved edges, and ask them to describe the edge of each object. Does it form a straight line? Or is it a curve? Discuss the difference between straight lines and curved lines and make sure pupils can identify which objects have straight edges and which have curved edges.

Mark two points on the board. Ask pupils how they could join these two points together. They may suggest joining them together with a straight line. Use a ruler and join them together. Explain that a straight line is the shortest distance between two points, but there are other ways to join the points.

Demonstrate drawing, freehand various curves between the points. Show the pupils a map, and ask them to trace the shape of the roads between different places. Are the roads straight or curved? They will find that most are curved, but there may be straight sections.

Talk about the routes pupils take to come to school. Do they take the shortest route? Discuss how sometimes we can't take the shortest route because we have to go around obstacles.

Complete Exercises 1 and 2 on pages 120 and 121 in the Pupil's Book.

### Answers

**Exercise 1**

1. Straight lines – board, picture, desk, floor, door, books, cupboard, ruler.
   Curved lines – chairs, globe, vase, ball, carpet, scissors, clock
2. No straight lines.
3. Curved lines – tree, flowers, hill, river, grass.
4. There are very few straight lines in nature.

**Exercise 2**

1. **a)** A – 8 cm
   **b)** B – 9 cm
   **c)** C – 6,5 cm
   **d)** D – 7 cm
   **e)** E – 6 cm
2. E, C, D, A, B
3. Teacher to check lines.
4. Teacher to check.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to draw and measure straight lines; identify everyday examples of straight and curved lines.

**Support activity**

Pupils may need extra support with identifying straight lines in everyday examples. Suggest that they use a ruler and hold it against the object/picture of object to determine whether it is straight or curved. A curved line will not follow a ruler. Ask pupils to use a magazine and cut out pictures showing straight lines and pictures showing curved lines.

**Homework activity**

Pupils can complete Exercise 2 for homework if they have not completed it in class.

## Lesson 2 *Pupil's Book page 122*

### Preparation

You will need to have:

- Card shapes, circle, triangle, square, rectangle, oval
- Maps
- Coins and buttons
- Pupil's Book

### Starter activity

Show the pupils a range of card shapes. Put them into two groups: squares, rectangles and triangles in one group and ovals and circles in another group, and ask the pupils what is the difference between the two groups. Tell them to consider the properties they already know about the shapes. They should recognise that the difference is that one group has curved edges and one has straight edges.

### Lesson focus

Revise the difference between straight and curved lines. Draw a few examples of each on the board, including circles and ovals for curved lines. Pupils should see that all the straight lines join two points together. Look at the curves. Some of these join two points together, but circles and ovals are different – they join one point back to itself.

Allow pupils to trace the curves with their fingers. Ask them to look around the classroom and identify curved lines. Many of the curved lines may be on three-dimensional objects such as light tubes or buckets, but this does not matter, as long as they recognise that they are curves. They should also be encouraged to look for curves between two points though, such as on parts of pictures or maps.

Give pupils the opportunity to practise drawing curved lines freehand and by tracing around objects such as coins or buttons.

Complete Exercises 3 and 4 on page 122 in the Pupil's Book.

### Answers

**Exercise 3**

**1.** 1
**2.** curved
**3.** 0
**4.** an egg, eye, etc.

**Exercise 4**

Teacher to check that lines are correctly drawn in blue or red.

**Homework**

Check pupils' drawings to make sure they can correctly identify straight-lined objects and curved objects used in daily life.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify and draw straight and curved lines.

**Extension activity**

Ask pupils to make up and draw their own shapes, one containing only straight lines, one containing only curved lines, and one containing both straight and curved lines. They can swap shapes with a partner and identify the straight and curved lines in each other's shapes.

**Homework activity**

Draw two objects having curved sides and two objects having straight sides from home.

## Lesson 3 *Pupil's Book page 123*

### Preparation

You will need to have:
- Maps
- String/wool
- Ruler
- Pupil's Book

### Lesson focus

Give each group of pupils a map and ask them to find various locations. Ask them to trace the route between locations using their fingers. Discuss why the distances are not straight lines. Discuss how you would be able to measure these routes or distances – could you use a ruler? No because the lines are not straight. Ask pupils to make suggestions about how to measure the distances.

Demonstrate on a wall/board map how to use a piece of string to measure a curved line. Give each group of pupils a piece of string and let them practise measuring curved lines on the map. Make sure each pupil in the group has a chance to trace a curved distance with the string and then measure the string using a ruler.

Complete Exercise 5 on page 123 in the Pupil's Book.

### Answers

**Exercise 5**

Teacher to supervise and check measurements.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to measure curved lines by tracing them with string or wool and then measuring the string or wool using a ruler.

**Extension activity**

Ask pupils to trace their hand print into their books and use string or wool to measure their hand print.

**Support activity**

Give pupils extra practice by asking them to draw their own curved shapes, exchange shapes with a partner and measure each other's shapes using the string. Guide them as they trace out the line using the string, making sure they mark the point where they start and do not overlap the string across this point at the end.

## Revision lesson for Unit 29

*Pupil's Book pages 120–123; Workbook page 44*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 29:
- Distinguishing between curves and straight lines.
- Measuring straight and curved lines.
- Identifying the presence of straight lines and curves in real life situations.

Make sure that pupils are familiar with the key word definitions for this unit:
- *straight:* a straight line can be drawn with a ruler
- *curved:* a curved line cannot be drawn with a ruler

Complete Worksheet 29 (Workbook page 44).

### Answers

**Worksheet 29**

Teacher to check drawings.
Teacher to check measurements.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to explain the difference between a straight line and a curve; measure a straight line and a curve; identify everyday examples of straight lines and curves.

# Unit 30 Straight-line shapes

**Objectives**

By the end of this unit, pupils will be able to:

- State properties of squares, rectangles and triangles.
- Identify shapes in everyday life which are square, rectangular, triangular and circular.
- Draw squares, rectangles, triangles and circles.

## Suggested resources

You will need to have:

- Labels: circle, square, rectangle, triangle, isosceles triangle, equilateral triangle
- Card and paper shapes (of above shapes including a scalene and right-angled triangles)
- Paper for folding
- Pupil's Book
- Workbook

## Key word definitions

*properties:* characteristics or attributes of a shape
*characteristics:* features or qualities
*parallel:* two lines are parallel if they never meet
*right-angled:* having an angle which is equal to 90°
*angles:* the amount of turn between two straight lines
*corners:* where two sides of a shape meet
*equilateral:* a triangle with three equal sides
*isosceles:* a triangle with two equal sides
*scalene:* a triangle with three different length sides

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to identify circle, triangle, square, and rectangle. They need to be able to differentiate between straight and curved lines.
**Q** *Is an equilateral triangle also an isosceles triangle?*
**A** Yes, an equilateral triangle has two sides the same length and is therefore also an isosceles triangle. The difference is that the third side is also of the same length, thus making it an equilateral triangle and therefore different from other isosceles triangles. (An isosceles triangle, though, is not an equilateral triangle.)

## Common errors pupils make

Pupils will take some time to learn the mathematical vocabulary. The more opportunities the pupils have to use the words themselves and not just hear the teacher using them, the quicker they will learn the words with an understanding of their meaning and be able to relate the properties of the shapes to the actual names.

## Evaluation guide

Assess whether pupils can:

- State the relationship between sides and angles of a square, a rectangle and a triangle.
- State important properties of squares, rectangles and triangles.
- Draw and label a square, a rectangle and a triangle.
- Explain the difference between equilateral, isosceles, scale and right-angled triangles.

## Lesson 1 *Pupil's Book page 124*

### Preparation

You will need to have:

- Paper squares and rectangles
- Paper for folding
- Pupil's Book

### Starter activity

Hold up a square and some rectangular cards and ask pupils to name them. Count with pupils the number of sides each shape has. Rearrange them and ask one of them to pick a square out. How do they know it is a square? It has four sides equal. Repeat the same for other shapes. Be sure to show shapes in different orientations.

### Lesson focus

Hold up a square and ask pupils to describe it. Answers should include that it has four sides, four equal sides, four corners etc. Encourage them to count the number of corners. A square has four corners. Tell them that these corners are called square corners, or right angles.

Now ask pupils to draw a square on a piece of paper. Remind them that all the sides have to be the same length. They can use the corner of a sheet of paper and a ruler to help them make sure they draw square corners. Some pupils may need to practise getting their corners square, and all should be encouraged to check all their measurements and corners carefully. Once they have an accurate square they should cut this out and use this to explore the classroom to look for other square corners. Challenge them to find unusual square corners, such as in the middle of pictures, which may not be immediately obvious.

Now direct pupils to look at the sides of their square. Not only are all four sides equal, but opposite sides of a square are parallel. Explain that parallel lines never meet – draw a few pairs of lines on the board and ask pupils whether they are parallel or not. Now ask pupils to look around the classroom and find any parallel lines (for example, the sides of the door, the edges of the board, etc.).

Practise drawing a square with pupils, guiding them to use their rulers to make sure the four sides are equal, and to help them draw the corners.

Complete Exercise 1 on page 124 in the Pupil's Book.

### Answers

**Exercise 1**

Teacher to check drawings.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify, draw and describe the properties of a square. They should be able to identify right angles and parallel lines.

**Extension activity**

Guide pupils to make an accurate square out of paper. Take any piece of paper and fold one edge to meet the adjacent edge and fold the crease. Cut away the excess paper and unfold the square. Pupils can use their squares to check right angles in shapes and objects.

**Homework activity**

Ask pupils to write down the name of three square objects they have in their homes.

## Lesson 2 *Pupil's Book page 125*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Ask pupils to look around the classroom and identify five examples of square corners. They can use a cut out square from the previous lesson to help them. Now ask them to identify five examples of parallel lines in the classroom.

### Lesson focus

Hold up a rectangle and ask pupils to describe its properties, focusing first on the angles and then on the sides. They should note that a rectangle has four square corners or right angles, and that its opposite sides are both equal and parallel. Ask them what the similarities and differences are between a square and a rectangle.

Draw parallel and perpendicular lines on the board and help pupils to distinguish between the two. Both rectangles and squares contain both parallel and perpendicular lines. Ask pupils to draw a pair of parallel lines and a pair of perpendicular lines in their books.

Complete Exercise 2 on page 125 in the Pupil's Book.

### Answers

**Exercise 2**

1. Teacher to check drawings.
2. Teacher to check measurements and names of objects.
3. Both have four right angles, both have opposite sides parallel.
4. A square has four sides equal, a rectangle only has opposite sides equal.
5. 24 corners.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify, draw and describe the properties of rectangles. They should be able to describe the similarities and differences between squares and rectangles.

**Extension activity**

Pupils can complete the challenge on page 125 in the Pupil's Book. (The drawing could be used for a board game such as chess or checkers.)

**Support activity**

Show pupils cardboard cut-outs of square and rectangles. For each one, ask them if it is a square or a rectangle, and ask them to explain their answer. They can use a ruler to help them decide by measuring the sides if they are not sure.

**Homework activity**

Ask pupils to find three rectangular shapes at home or in a magazine and to draw them or cut them out and paste them in their books. They can write down the properties of a rectangle next to their drawings.

## Lesson 3 *Pupil's Book page 126*

### Preparation

You will need to have:

- Labels: circle, square, rectangle, triangle, isosceles triangle, equilateral triangle
- Card shapes (of above shapes including a scalene and right-angled triangles)
- Pupil's Book

### Starter activity

Hold up the card shapes of the circle, square, rectangle and triangle one at a time and ask pupils to name the shape and say one fact about it. For example: A square. It has four sides.

### Lesson focus

Ask four pupils to come to the front. Give each child a different type of triangle to hold. Ask the class: What shapes are these? How do we know? They all have three straight sides and three corners. Are they all the same? No. Ask pupils to explain how each of the triangles is different. Encourage pupils to look carefully at the properties of the triangles.

Ask the pupil holding the isosceles triangle to step forward. Hold up the label isosceles triangle and tell pupils this is the name of this type of triangle. Ask pupils to repeat the name. How is this triangle special? It has two sides of equal length.

Ask the pupil holding the equilateral triangle to step forward. Hold up the equilateral triangle label and tell pupils this is the name of this type of triangle. Ask pupils to repeat the name. How is this triangle special? All three sides are the same length.

Ask the pupil holding the scalene triangle to step forward. Hold up the label scalene triangle and tell pupils this is the name of this type of triangle. Ask pupils to repeat the name. How is this triangle special? It has three sides of different length.

Ask the pupil holding the right-angled triangle to step forward. Hold up the label right-angled triangle and tell pupils this is the name of this type of triangle. Ask pupils to repeat the name. How is this triangle special? It has one right angle.

Collect in all the triangles and mix them up. Hold them up one at a time asking the class to say if it is an equilateral triangle, an isosceles triangle, a scalene triangle or a right-angled triangle (some triangles may be both isosceles and right-angled, or both scalene and right-angled). When presenting the isosceles triangle make sure it is not always presented with the side that is different along the base. Present all the triangles in different orientations.

Complete Exercise 3 on page 126 in the Pupil's Book.

### Answers

**Exercise 3**

1. **a)** E and F
   **b)** There are no equilateral triangles shown.
   **c)** A and C
   **d)** B and D
2. Teacher to check drawings.
3. **a)** Always has one right-angle.
   **b)** Sometimes has one right-angle.
   **c)** No right angles.
   **d)** Sometimes has one right-angle.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify and draw triangles; and distinguish between isosceles, equilateral, right-angled and scalene triangles.

**Support activity**

Help pupils to make their own triangle cut-outs, one for each type of triangle. As they make them, discuss the properties of each triangle with them again. They can use these cut-outs to help them complete the exercise.

## Lesson 4 *Pupil's Book page 128*

### Preparation

You will need to have:

- Card shapes: circle, square, rectangle, isosceles, equilateral, right-angled and scalene triangles
- Pupil's Book

### Starter activity

Place the card shapes in the small bag and ask one pupil at a time to choose a shape without the rest of the class seeing. Give one fact about its properties. Ask the class to guess which shape they are holding from the clue given. If the answer is incorrect ask the pupil to give the class another fact. Repeat until the name of the shape is correctly given. Ask another pupil to take a shape and repeat the task.

### Lesson focus

Hold up one of the card templates. Ask pupils to give one fact that describes this shape. Pupils are not required at this stage to know the names of these other shapes. The exercise is purely for pupils to recognise properties of shapes and to use mathematical language to describe them.

Encourage pupils to count corners, and to describe and count the sides including observing sides that are of equal length. Descriptions can be extended to include parallel lines.

Give out the templates for pupils to draw round and cut out so that they may explore some different shapes. Go round the class and ask for a fact about the shape they have drawn.

Complete Exercise 4 (Pupil's Book page 127) and Exercise 5 (Pupil's Book page 129).

### Answers

**Exercise 4**

**1.** Teacher to check.
**2.** **a)** A, B, C, E, G, H
**b)** A and C
**3.** **a)** square
**b)** circle
**c)** rectangle (or square)
**d)** right-angled triangle
**e)** equilateral triangle
**f)** isosceles triangle

**Exercise 5**

**1.** **a)** isosceles triangle
**b)** circle
**c)** equilateral triangle
**2.** Joy's shapes have the most sides (6).
**3.** Sam's shapes have the most square corners (8).
**4.** Teacher to check.

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify, draw and describe the properties of squares, rectangles, circles and triangles.

**Extension activity**

Using pre-cut shapes (or get the pupils to draw and cut shapes themselves), ask pupils to create a picture by tracing the shapes.

**Homework activity**

Pupils can complete Exercise 5 for homework.

## Revision lesson for Unit 30

*Pupil's Book pages 124–129; Workbook page 45*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 30:
- Stating properties of squares, rectangles and triangles.
- Identifying shapes in everyday life, which are square, rectangular, triangular and circular.
- Drawing squares, rectangles, triangles and circles.

Make sure that pupils are familiar with the key word definitions for this unit:
- *properties:* characteristics or attributes of a shape
- *characteristics:* features or qualities
- *parallel:* two lines are parallel if they never meet
- *right-angled:* having an angle which is equal to 90°
- *angles:* the amount of turn between two straight lines
- *corners:* where two sides of a shape meet
- *equilateral:* a triangle with three equal sides
- *isosceles:* a triangle with two equal sides
- *scalene:* a triangle with three different length sides

Complete Worksheet 30 (Workbook page 45).

### Answers

**Worksheet 30**

**1. a)** I have four corners. I have four sides. I have no curves. I am a square.
**b)** I have four corners. I have four sides. I have no curves. I am a rectangle.
**c)** I have no corners. I have one side. I have one curve. I am a circle.

**2.** Teacher to check that isosceles triangles are correctly circled.

**3.** Teacher to check that equilateral triangles are correctly circled.

**4.** Teacher to check drawing.

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to state the relationship between sides and angles of a square, a rectangle and a triangle; state important properties of squares, rectangles and triangles; draw and label a square, a rectangle and a triangle; explain the difference between equilateral, isosceles, scale and right-angled triangles.

# Unit 31 Lines of symmetry

**Objectives**

By the end of this unit, pupils will be able to:
- Identify shapes with line(s) of symmetry.
- Identify lines of symmetry in everyday life.

## Suggested resources

You will need to have:
- Pre-cut paper shapes of squares, isosceles, equilateral, right-angled and scalene triangles, rectangles and circles
- Pupil's Book
- Workbook

## Key word definitions

*symmetry:* a line of symmetry is a line that divides an object or shape into two equal parts
*symmetrical:* a shape is symmetrical when one half is exactly the same as the other half
*mirror image:* two sides of a shape are mirror images when they are like reflections of each other in a mirror

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to draw straight lines using a ruler. They need to be able to identify squares, rectangles, triangles and circles.

## Common errors pupils make

Pupils may assume that lines drawn between opposite corners of a shape are lines of symmetry. Show them that this is not always the case, for example in a rectangle, by folding it across the diagonals.

## Evaluation guide

Assess whether pupils can:
- Verify whether or not given plane shapes have lines of symmetry.
- Find the number of lines of symmetry in each plane shape.
- Identify lines of symmetry in everyday life.

## Lesson 1 *Pupil's Book page 130*

## Preparation

You will need to have:
- Pre-cut paper shapes of squares, isosceles, equilateral, right-angled and scalene triangles, rectangles and circles
- Paper squares, rectangles and circles
- Pupil's Book

## Starter activity

Hold up the paper shapes, and ask pupils to give you their names, and describe all the properties they know about them. Hide one of the shapes behind your back, and describe the properties to the pupils. Can they tell you the name of the shape?

## Lesson focus

Hand out paper squares, rectangles and circles to pupils so that each pupil has one of each shape (or ask pupils to draw their own shapes and cut them out). Ask them to fold each of their shapes in half – walk around and look at their folds, guide them to fold exactly in half so that the opposite sides, edges or vertices meet.

Explain that when we can fold a shape exactly in half so that the two halves are reflections, or mirror images of each other, the shape is symmetrical. A line of symmetry is the line which divides the shape into two symmetrical halves. Explain that a line of symmetry can be found by folding a shape in half so that both sides are in line with each other, as pupils have done with their shapes. Ask them to draw a line over the fold in each shape – this is the line of symmetry.

Now hold up a big rectangle and fold it in half to show a line of symmetry. Ask pupils if a rectangle has more than one line of symmetry. Ask a child to come and demonstrate with your piece of paper. Ask pupils if a rectangle has a line of symmetry going from corner to corner. Ask a child to fold the sheet of paper to check.

Ask pupils to fold their shapes in different ways to find any other lines of symmetry. When pupils have tried some of the shapes, ask them to complete Exercise 1 (Pupil's Book page 130).

## Answers

**Exercise 1**

**1.** Teacher to check.
**2.** Teacher to check.
**3.** 4 lines of symmetry
**4.** 2 lines of symmetry
**5.** Infinite number of (many, cannot be counted) lines of symmetry

**Assessment**

Observe and listen to the pupils during the lesson. Observe them folding shapes. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to verify whether or not squares, rectangles and circles have lines of symmetry; and state the number of lines of symmetry in squares, rectangles and circles.

**Extension activity**

Ask pupils to fold shapes in half, then half again and if they want to, in half again. Then cut around the edge of the unfolded sides to make a new shape – cuts may be curved or zigzag. Fold out the new shapes and draw the lines of symmetry. Ask pupils to draw their own shapes, cut them out and fold them to find any lines of symmetry.

**Support activity**

Show pupils cut out shapes (squares, rectangles and circles) and ask them how many lines of symmetry each shape has. Guide them as they fold the shapes to work out the answer. Make sure they are folding correctly, with opposite sides or corners meeting exactly.

**Homework activity**

Ask pupils to find three objects at home, one square, rectangular and circular, and to draw each object and draw its lines of symmetry.

## Lesson 2 *Pupil's Book page 131*

### Preparation

You will need to have:

- Card cut outs of different types of triangles, including equilateral, isosceles, scalene and right-angled
- Cardboard
- Pupil's Book

### Starter activity

Place the card triangles in a small bag and ask one pupil at a time to choose a triangle without the rest of the class seeing and to give one fact about its properties. Ask the class to guess which triangle they are holding from the clue given. If the answer is incorrect ask the pupil to give the class another fact. Repeat until the name of the triangle is correctly given. Ask another pupil to take a triangle and repeat the task.

### Lesson focus

Once pupils have revised identifying types of triangles in the starter activity, and discussed their properties, ask them to complete Exercise 2 on page 131 in the Pupil's Book.

Once they have completed the exercise, discuss it by showing pupils a paper isosceles triangle and ask them what kind of triangle it is. Do they think it is symmetrical? Ask a pupil to come and fold an isosceles triangle along its line of symmetry. Does an isosceles triangle have any other lines of symmetry?

Repeat with an equilateral and a scalene triangle. Pupils should see that an equilateral triangle has three lines of symmetry, an isosceles triangle has only one line of symmetry, and a scalene triangle does not have any lines of symmetry.

Complete Exercise 3 on page 131 in the Pupil's Book.

### Answers

**Exercise 2**

**1.** Teacher to supervise folding
   **a)** three
   **b)** one

**Exercise 3**

Teacher to check

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify, draw and describe the number of lines of symmetry in different types of triangles.

**Extension activity**

Complete the challenge on page 132 in the Pupil's Book.

**Support activity**

Hand out paper cut outs of the different types of triangles and give pupils more practice folding them along their lines of symmetry. They should be able to clearly see and identify the number of lines of symmetry in each type of triangle. Help them with folding shapes, making sure that the opposite sides of the triangles match up exactly.

## Lesson 3 *Pupil's Book page 132*

### Preparation

You will need to have:
- Card shapes
- Pictures of symmetrical flags
- Pupil's Book

### Starter activity

Hold up the card shapes used in lessons one and two. Ask pupils to say how many lines of symmetry each shape has and ask them to say one other fact about that shape.

### Lesson focus

Show pupils a Nigerian flag and ask them if it is symmetrical. Draw the flag on the board and draw the line of symmetry. Show pupils pictures of other symmetrical flags and ask them where the line of symmetry is.

Ask pupils if they can think of any other objects or items which display symmetry, specifically in nature. They may suggest flowers, leaves, fruit, etc. Discuss how we can tell if something is symmetrical or not.

Complete Exercises 4 and 5 on pages 132 in the Pupil's Book.

### Answers

**Exercise 4**

Teacher to check that lines of symmetry are correctly drawn.

**Exercise 5**

**1.** not symmetrical
**2.** symmetrical
**3.** not symmetrical
**4.** not symmetrical
**5.** not symmetrical
**6.** symmetrical

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to recognise and identify lines of symmetry in everyday life.

**Extension activity**

Complete the puzzle on page 132 in the Pupil's Book.

**Homework activity**

Pupils can complete Exercise 6 on page 133 in the Pupil's Book for homework.

## Revision lesson for Unit 31

*Pupil's Book pages 130–133; Workbook page 47*

### Preparation

You will need to have:
- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 31:
- Identifying shapes with line(s) of symmetry.
- Identifying lines of symmetry in everyday life.

Make sure that pupils are familiar with the key word definitions for this unit:
- *symmetry:* a line of symmetry is a line that divides an object or shape into two equal parts
- *symmetrical:* a shape is symmetrical when one half is exactly the same as the other half
- *mirror image:* two sides of a shape are mirror images when they are like reflections of each other in a mirror

Complete Worksheet 31 (Workbook page 47).

## Answers

**Worksheet 31**

**1.** Teacher to check that lines of symmetry are correctly drawn.

**2.** **a)** 4
**b)** 1
**c)** infinite
**d)** 2
**e)** 3

### Assessment

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to verify whether or not given plane shapes have lines of symmetry; find the number of lines of symmetry in each plane shape; and identify lines of symmetry in everyday life.

# Unit 32 Pictograms and mode

**Objectives**

By the end of this unit, pupils will be able to:
- Read information from pictograms using vertical and horizontal arrangements.
- Represent information on a pictogram.
- Identify the most common features of a pictogram (the mode).
- Mention the usefulness of pictograms and the mode.

## Suggested resources

You will need to have:
- Large sheet of paper or card
- Small pieces of paper
- Crayons, scissors, glue
- Pupil's Book
- Workbook

## Key word definitions

*pictogram:* a pictogram uses pictures to show data or information which has been collected
*data:* information which has been collected
*information:* facts which are provided, learnt or gathered
*popular:* the most common
*mode:* the most common item in a set of data
*common:* occurring often

## Frequently asked questions

**Q** *What prior knowledge do the pupils need?*
**A** Pupils need to be able to compare quantities and lengths. They need to understand what is meant by 'most popular', 'least favourite', etc.
**Q** *Is a pictogram the same as a pictograph?*
**A** Yes. Pictograms are also called pictographs and picture graphs. So as not to confuse pupils, this unit refers only to pictograms.

## Common errors pupils make

Pupils may not align their pictures accurately and so misrepresent results. Ensure that pupils look closely where they are drawing the pictures in the pictogram, maybe using a ruler and faint lines to guide them. Pupils can sometimes include the picture on the bottom axis when counting their totals in a pictogram. Encourage pupils to only count from above the line and to look at the number that the picture is in line with.

## Evaluation guide

Assess whether pupils can:
- Represent given information on a pictogram.
- Give examples of real life situations where pictograms can be used.
- Find the mode on a given pictogram.
- State the mode of information or an event within the environment.

## Lesson 1 *Pupil's Book page 134*

### Preparation

You will need to have:

- Large sheet of paper or card
- Small pieces of paper
- Crayons/scissors/glue
- Pupil's Book

### Starter activity

Recap work covered in data handling in Grade 2 – collecting data. What is data? Information. What is a tally? Tally marks are simple strokes used to represent individual units of the things being counted. Show pupils a simple table of results to demonstrate how the tallies are written and totalled, and how the information is displayed.

### Lesson focus

Explain that to be able to look at results closely and compare data, it is best to put the results into a graph. A graph is a drawing or diagram used to record information. There are different types of graphs but we are going to be looking at just one type of graph called a pictogram. A pictogram is a graph that uses pictures to represent an amount.

Explain that, in a pictogram, you need to have two lines. (Draw a large 'L' shape on the board.) One line shows the answers given to the question asked and the other line is used to compare the numbers of pictures drawn.

Our question is: Which is your favourite animal of the 'Big Five'? Write the question on the board and draw the heads of the Big Five – lion, elephant, buffalo, rhino and leopard. Give each child a small piece of paper (about 5 × 5 cm). Ask pupils to draw the face of their favourite animal of the Big Five.

Draw on the large sheet of paper the two axes of the graph and draw the five animal heads along the bottom, equally spaced. Write the question 'Which is your favourite animal of the Big Five?' at the top, and explain that this can form the title for your pictograph.

When pupils have finished their drawing ask them to come and stick their picture on the graph above the matching animal. The first drawing for each column must start at the bottom, and the next ones should be placed exactly above them without leaving a gap. Explain that it is important that the drawings should be lined up, so that you can always see which is the tallest column, without having to count them every time. Explain that sometimes it is easier to use lined or squared paper to make sure your pictures are lined up. Look together at the pictograph showing pupils' favourite colour crayons on page 134 of the Pupils book, to show how this can be done.

When the graph is finished, ask pupils to look closely at the graph. Ask the class the following questions:

- What is the most popular Big Five animal in the class?
- What is the least popular?
- How can we find out how many pupils have contributed to this graph?
- Did more pupils prefer leopards or buffalos?
- Did more pupils prefer lions or elephants?
- How many more/less pupils preferred rhinos to elephants?

Ask pupils to complete Exercise 1 on page 134 in the Pupil's Book.

### Answers

**Exercise 1**

**1.** blue
**2.** yellow
**3.** purple
**4.** purple
**5.** 26 pupils

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to represent information in a pictogram and read information from a pictogram.

**Extension activity**
Ask pupils to ask their friends their favourite colour. Record the results in a tally/results table.

**Support activity**
Draw another pictogram with pupils who need extra support, asking a question such as 'how do you get to school?'(walk, bicycle, car, bus, taxi). Work through the list of questions below slowly, making sure they are all able to answer them:

- What is the most popular means of getting to school?
- What is the least popular means of getting to school?
- Do more pupils walk or catch the bus to school?
- How many pupils answered the question?

## Lesson 2 *Pupil's Book page 135*

### Preparation

You will need to have:

- Pupil's Book

### Starter activity

Draw a tally table on the board showing shoe sizes and ask pupils copy it into their books. They can walk around the class and complete the tally table showing the shoe size of everyone in the class. Which is the most common shoe size in the class?

### Lesson focus

Ask pupils what their favourite number is from 1 to 10. Write down all the numbers on the board. Now ask pupils which is the most popular number from 1 to 10 in the class.

Explain that the most popular or most common object or number in a set of data is called the mode. In order to identify the mode, we need to count the number of times each object or number appears in the set of data. Sometimes we will be able to see the mode immediately, but sometimes we will need to count a few of the numbers or objects in order to make sure.

Work through the example on page 135 in the Pupil's Book, and guide pupils as they complete Exercise 2 (Pupil's Book page 135) and Exercise 3 (Pupil's Book page 136).

### Answers

**Exercise 2**

**1.** 5
**2.** 7
**3.** 3
**4.** 8
**5.** 23
**6.** 41 km
**7.** 50 ml

**Exercise 3**

**1.** between 10 and 20
**2.** between 10 and 20
**3.** 100
**4.** 3 people

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to identify the mode in a given set of data.

**Extension activity**

Ask pupils to make a tally table showing the month in which each pupil in the class was born. What is the most common birth month in the class – the mode of the data?

**Support activity**

Have pupils find the mode of these sets of data, giving them extra support as they do so:

3, 5, 2, 3, 2, 2, 2, 5, 1, 5, 4, 2, 4, 2, 5, 1, 2

102, 100, 105, 102, 101, 105, 104, 102, 102, 103, 104, 102

25g, 28g, 25g, 31g, 28g, 27g, 28g, 28g, 30g, 31g, 28g, 27g, 32g, 24g, 28g, 32g, 28g

## Lesson 3 *Pupil's Book page 136*

### Preparation

You will need to have:

- Pupil's Book.

### Starter activity

Hold the cardboard used in the previous lesson to draw the pictogram of the Big Five. Recap with pupils how to draw the pictogram.

### Lesson focus

Ask pupils which is the most popular animal in the Big Five, based on their pictogram. The mode is the thing that occurs most often, represented by the tallest column. Which animal is the mode in this pictogram? We can tell this immediately from the diagram, even without counting, as it makes the tallest column, but if we want to know how many pupils liked this animal best, we would need to count the number of pictures.

Complete Exercises 4 and 5 on pages 136 and 137 in the Pupil's Book. Exercise 5 can be used as informal assessment. Check their answers and provide corrections where necessary. Tell pupils that pineapples cost ₦2 each.

### Answers

**Exercise 4**

Teacher to check pictogram and mode.

**Exercise 5**

**1.** ₦16
**2.** ₦9
**3.** ₦24 (avocados)
**4.** 24 – 19 = 15
**5.** ₦97
**6.** ₦11 (pineapples)

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Pupil's Book. Pupils should be able to read information off a pictogram (including the mode) and represent information on a pictogram. They should be able to identify the mode of a given set of information.

**Support activity**

Recap the features of a pictogram and how to find the mode using a pictogram. Make sure pupils align their pictures accurately, otherwise they may misinterpret results. Ensure that pupils look closely where they are drawing the pictures in the pictogram, maybe using a ruler and faint lines to guide them.

**Homework activity**

Make a list of any five types of food, and ask at least 20 people (you can include your classmates) which of these foods is their favourite. Use your collected data to draw a pictograph. Find the mode of your data.

## Revision lesson for Unit 32

*Pupil's Book page 134–137; Workbook page 48*

### Preparation

You will need to have:

- Workbook
- Pupil's Book

### Lesson focus

Revise the work covered in Unit 32:

- Reading information from pictograms using vertical and horizontal arrangements.
- Representing information on a pictogram.
- Identifying the most common features of a pictogram (the mode).
- Mentioning the usefulness of pictograms and the mode.

Make sure that pupils are familiar with the key word definitions for this unit:

- *pictogram:* a pictogram uses pictures to show data or information which has been collected
- *data:* information which has been collected
- *information:* facts which are provided, learnt or gathered
- *popular:* the most common
- *mode:* the most common item in a set of data
- *common:* occurring often

Complete Worksheet 32 (Workbook page 48).

### Answers

**Worksheet 32**

**1.** A pictogram is a chart which uses pictures to show data or information which has been collected.

**2.** Teacher to check.

**3.** **a)** 4
**b)** 21

**Assessment**

Observe and listen to the pupils during the lesson. Look at their answers to the exercises in the Workbook. Pupils should be able to represent given information on a pictogram; give examples of real life situations where pictograms can be used; find the mode on a given pictogram; and state the mode of information or an event within the environment.

# Term 3 Project

**Objectives**

This project forms part of a summative assessment of work covered in Term 3. It specifically

- provides the opportunity for pupils to show their understanding of simple properties of 2-D shapes, to create simple patterns and pictures using 2-D shapes and to solve simple problems and puzzles involving 2-D shapes.
- The project is designed to assess pupils' mathematical understanding and ability to apply their
- knowledge in different contexts. It encourages creative thinking and problem-solving.

## Mosaic boxes *Pupil's Book page 138*

### Preparation

You will need to have:

- Coloured paper squares, rectangles and triangles (make sure the triangles are made from squares cut in half so that they will fit together better in the mosaic)
- Glue
- Small cardboard boxes (such as empty food packages, which may need to be turned inside out)
- Pictures of mosaics in art, on buildings, in history, on tiles, etc.
- Pupil's Book

### Starter activity

This project could be part of a focus on art and/or history. Pass round the pictures of mosaics for pupils to look at. Ask them to describe what they see in the pictures. Can they see different patterns that have been used? How have people made pictures in the mosaics? Explain that mosaics are about fitting together different shapes and colours to create a picture or pattern.

### Lesson focus

Look together at the mosaic boxes project in the Pupil's Book (page 138). Read through the instructions together answering any questions that are raised. Hand out the boxes, glue and paper shapes and ask pupils to read through the instructions again before starting. Ask them to think about their patterns or pictures and maybe draw a couple of ideas on paper. Ask them to make their mosaic boxes.

**Assessment**

As pupils explore the gift boxes, listen to the language they use to describe them. Are they using mathematical terms? This project is meant as an independent task and so this gives the opportunity to observe and question pupils as they work.

Pupils should be able to understand simple properties of 2-D shapes.

Pupils should be able to create simple patterns and pictures using 2-D shapes.

Pupils should be able to solve simple problems and puzzles involving 2-D shapes.

# Term 3 Assessment

**Objectives**

- This assessment is a summative assessment of work covered in Units 22 to 32.
- This assessment is designed to assess the pupils' mathematical understanding and not their reading ability. It is also important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a pupil may be having with particular concepts.

**Guidelines**

- It is therefore best carried out with small groups of pupils under the guidance of the teacher who should read each question carefully to them, and give them time to complete the question before moving on to the next question.
- A more able group within the class may be able to complete the assessment without the need for the teacher to read the questions. However, observing pupils while they are completing the assessment, provides further information.
- On completion of the assessment, teachers should look for correct answers and mistakes made by individuals. They should also be checking to see if there is a pattern in terms of any particular question causing a significant number of pupils' difficulties. By analysing the results of an assessment, teachers can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities. They are also able to identify any weaknesses in their teaching programme and make adjustments as necessary.

## Preparation

You will need to have:

- Pupil's Book

## Answers

**1.** two of: metres, centimetres, millimetres, kilometres

**2.** 100

**3.** **a)** A – 10,8 cm **b)** B – 6,4 cm

**4.** **a)** A **c)** 4,4 cm
**b)** B

**5.** Teacher to check that lines are correct length.

**6.** **a)** 5,7 cm **d)** 11 cm
**b)** 3,4 cm **e)** 18,2 cm
**c)** 12 cm

**7.** **a)** 2 **b)** 4

**8.** Teacher to check drawings.

**9.** It has four sides, all four sides are equal, opposite sides are parallel, it has four angles, all four angles are right angles.

**10.** Teacher to check drawings.

**11.** Teacher to check drawings.

**12.** **a)** 150 g **c)** 4 kg
**b)** 65 g **d)** 2 kg

**13** **a)** 500 ml **c)** 250 ml
**b)** 400 ml

**14.** **a)** 500 ml **c)** 150 ml
**b)** 200 ml

**15.** 10 times

**16.** 476 litres

**17.** 380 litres

**18.** **a)** A pictogram is a graph which uses pictures to show data or information which has been collected.
**b)** The mode is the most common object or number in a set of data.

**19.** **a)** 22 **e)** lion
**b)** half **f)** rhino
**c)** 7
**d)** ostrich

# Index