Unit 23 — Adding and subtracting weight

Objectives

By the end of this unit, each pupil should be able to:

- Change from one unit of weight to another
- Add and subtract weight in kilograms and grams
- Solve word problems involving addition and subtraction of weight.

🔧 Suggested resources

Weighing or balance scale; Objects to weigh, for example, bags sand or stones, weighing more than 1 kg; Small objects weighing less than 1 kg, for example, a pencil or note book; Wall charts showing place value of decimal numbers; Wall charts showing addition and subtraction of decimal numbers.

abc Key word definitions

weigh: put on a scale to measure the heaviness of something
mass: weight or heaviness
kilogram: the base unit used for measuring mass
gram: one $1\,000^{th}$ of a kg

✗ Common errors that pupils make

Pupils struggle to estimate mass, choosing objects that are totally inappropriate. Some pupils find it very difficult to form a mental idea of a kilogram. It will help these pupils greatly if they can hold a bag containing 1 kg of sand in one hand and an object weighing 1 kg in the other. Similarly, let them weigh off a mass of 50 g of sand in a bag, to compare with an object weighing 50 g.

✏ Evaluation guide

Pupils to:
1. Change from one unit of measure to another.
2. Perform addition and subtraction sums of kilograms and grams.
3. Solve problems on addition and subtraction of weights.

Lesson 1
Pupil's Book pages 146–147; Workbook page 40

⚙ Preparation

You will need to have:
- Scale balance and weighing scale
- 1 kg bag of sand or stones
- 500 g tin of sand or stones.

➲ Starter activity

Collect a variety of items on which the mass is clearly indicated. Ask your pupils to order the items from the lightest to the heaviest, and vice versa. Ask pupils to classify the items into two groups namely heavy and light. Items that do not fit into either of the categories could be the source of interesting discussion. Allow pupils to handle the different items as much as possible to build their concept of mass. Pupils can also be asked to arrange items into groups of similar masses.

🔍 Lesson focus

The emphasis of this lesson is on practical work, so that your pupils can build a realistic concept of 1 kg and 1 g.

Read through the introductory text with your class. Have a class discussion about why we need measuring tools if we want to measure accurately. Discuss why we need the units of kilogram and gram. What would the implication be if we used only kilograms or only grams? Did you know that some countries still use the Imperial system of measurement? Point out that we use the metric system, based on powers of 10.

Prepare a bag containing 1 kg of sand in advance and show your class how to measure this bag in a scale or a balance. If you feel it is practical to do so, you could let your pupils work in pairs as they measure off their own bags of 1 kg of sand. At the very least, allow all your pupils to feel the weight of the bag of sand that you have prepared, so that they can develop a sense of the weight of 1 kg.

Guide pupils to revise the conversion of kilograms to grams 1 kg = 1 000 g.

Ask pupils to do Exercise 1 then discuss the answers.

📖 Answers

Exercise 1

1. **a)** 7 kg 234 g; **b)** 7 kg 690 g; **c)** 3 kg 600 g; **d)** 15 kg 8 g
2. **a)** 6.890 kg; **b)** 2.674 kg; **c)** 38.700 kg; **d)** 49.275 kg
3. **a)** 11 050 g; **b)** 12 600 g; **c)** 4 372 g

Workbook

3. **a)** 1 000; **b)** 4 000; **c)** 15 000; **d)** 1 700
4. **a)** 0.2; **b)** 0.4; **c)** 0.75; **d)** 3.4
5. **a)** 2 350; **b)** 2.35

Assessment

Pupils should be able to change from grams to kilograms and vice versa.

Homework activity

Pupils are to complete questions 3–5 on page 40 of the WB.

| **Lesson 2** | *Pupil's Book pages 147–149;* *Workbook pages 39 and 40* |

⚙️ Preparation

You will need to have:
*   Scale balance and weighing scale
*   Objects to weigh, for example, bags sand or stones, weighing more than 1 kg
*   Small objects weighing less than 1 kg, for example, a pencil or note book
*   Wall charts showing place value of decimal numbers
*   Wall charts showing addition and subtraction of decimal numbers.

➲ Starter activity

Allow pupils to work in pairs to weigh small items of less than 500 g. Each pair weighs 2 items separately, and notes down the weights, which should have a sum of less than 1 kg. They then add the weights of the two items together and compare their addition with the actual weight. Repeat this exercise with a variety of items. Repeat this exercise with items weighing between 500 g and 1 kg.

🔍 Lesson focus

The focus of the lesson is to add grams and kilograms and then convert the sum to grams and/ or kilograms. Ask pupils to do Exercise 2.

📖 Answers

Exercise 2

1. **a)** 13 kg 200 g; **b)** 107 kg 80 g; **c)** 56.91 kg; **d)** 131.837 kg
2. **a)** 160.2 kg; **b)** 61 kg 80 g; **c)** 1 087.85 kg

Workbook

1. **a)** 283 g; **b)** 669 kg; **c)** 464 g; **d)** 862 kg
6. 350 g = 0.35 kg; Total weight = 705.3 kg

Assessment

Pupils should be able to add weights correctly and be able to change from grams to kilograms and vice versa.

Extension activity

Ask pupils to find 2–3 objects at home that together weight approximately 1 kg. Bring the objects to class and weigh them to see how accurate the pupils' estimations were.

Homework activity

Pupils are to complete questions 1 and 6 on pages 39 and 40 of the WB.

| **Lesson 3** | *Pupil's Book page 149;* *Workbook pages 39 and 40* |

⚙️ Preparation

You will need to have:
*   Scale balance and weighing scale

- Objects to weigh, for example, bags sand or stones, weighing more than 1 kg
- Small objects weighing less than 1 kg, for example, a pencil or note book
- Wall charts showing place value of decimal numbers
- Wall charts showing addition and subtraction of decimal numbers.

Starter activity

Repeat the exercise done in Lesson 2 but find the difference between the weights of items weighing less than 500 grams. Repeat this exercise with items weighing between 500 g and 2 kg.

Read through the text about subtracting weights.

Lesson focus

The focus of the lesson is to subtract grams and kilograms and then convert the difference to grams and/or kilograms. Ask your class to do Exercise 3.

Allow pupils to have fun together as a class completing the Puzzle on page 147 of the PB.

Answers

Exercise 3

1. **a)** 45 kg 942 g; **b)** 14 kg 107 g; **c)** 5.305 kg; **d)** 16.78 kg
2. **a)** 96 kg 490 g; **b)** 1.95 kg; **c)** 28.97 kg

Puzzle

1. Some whales are heavier than an elephant.
2. It is very unlikely that a person could weigh as much as a lion.
3. Dwarf hamsters are smaller than a mouse.

Workbook

2. a) 75; **b)** 102; **c)** 432; **d)** 133
7. 165 g; **8.** 55.7 kg

Assessment

Pupils should be able to subtract grams and kilograms and provide the answer in the correct unit of measure.

Support activity

Have pupils convert the weights in Exercise 3 question 1 into grams.

Homework activity

Pupils are to complete questions 2, 7 and 8 on pages 39 and 40 of the WB.

Lesson 4   *Pupil's Book page 151*

Preparation

You will need to have:
- The answers to the Revision exercise to hand.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor how they cope with integrating the content covered in this unit.

Answers

Revision exercise

1. **a)** 8 kg 750 g; **b)** 13 kg 450 g; **c)** 69.145 kg; **d)** 500 g; **e)** 250 g; **f)** 725 g
2. **a)** 66.95 kg; **b)** 10.28 kg; **c)** 16.5 kg; **d)** 16.1 kg
3. **a)** 28.98 kg; **b)** 2.95 kg
4. **a)** 150 g < 420 g; **b)** 0.9 kg < 1 000g; **c)** $\frac{3}{4}$ kg > $\frac{1}{2}$ kg; **d)** $\frac{3}{5}$ kg > $\frac{1}{2}$ kg

Assessment

Pupils should be able to arrange objects according to how heavy or light they are. They should be able to decide whether an object would be best measured in grams or in kilograms.

Check pupils' estimates of the masses of different objects and check pupils' answers to the Revision exercise.

Homework activity

Ask your pupils to make a list of five objects at home that weigh more than 1 kg and five that weigh less than 1 kg.

Unit 24 Multiplying and dividing weight

Objectives

By the end of this unit, each pupil should be able to:
- Multiply and divide weight by whole numbers
- Solve problems on multiplication and division of weight
- Learn how to multiply and divide with kilograms and grams.

🔧 Suggested resources

Place value table; Objects to weigh, for example, bags or cans of sand, stones, etc., weighing more than 1 kg; Small objects weighing less than 1 kg, for example, a pencil or notebook; Decimal chart showing division and multiplication; A chart showing multiplication and division of kg and g; Times table chart.

abc Key word definitions

multiply: find the product of two numbers
divide: find the quotient of two numbers
dividend: the number to be divided into another number
divisor: a number that divides into another

💬 Frequently asked questions

Q *Is multiplying and dividing units of weight the same as working with decimal numbers?*

A   It is exactly the same. Units of weight can be written as decimal numbers, for example, 5 g = 0.005 kg. 5 g × 10 = 50 g = 0.05 kg and 0.005 kg × 10 = 0.05 kg.

✗ Common errors that pupils make

Pupils may make mistakes when adding or subtracting mass with mixed units of kilograms and grams. This is often due to the pupils misreading the questions. For example, if pupils add 150 kg and 150 g. The second mass in the addition does not have both kg and g, pupils should be alerted to the fact that the second mass is 150 kg, not 150 g. If your pupils tend to make mistakes like these, you could ask them to work in

pairs and to check one another's calculations. Pupils at this level often enjoy playing 'teacher'; in other words, they enjoy finding and pointing out one another's mistakes. The need to be critical of a partner's work teaches them to be critical of their own work and to be more alert to possible mistakes.

Some pupils make simple calculation errors. Encourage pupils to use inverse operations to check answers.

Pupils write the wrong units in their answers, or forget to write the units altogether. Remind your pupils that masses are always written with the appropriate units. A mass of 50, for example, is meaningless– 50 what? Pumpkins? Carrots? Dogs? Kilograms? Grams?

✏️ Evaluation guide

Pupils to:
1. Multiply and divide weight by whole numbers.

Lesson 1   *Pupil's Book pages 152 and 153; Workbook page 41*

⚙️ Preparation

You will need to have:
- Place value table
- Decimal chart showing multiplication
- Chart showing multiplication of kg and g
- Times table chart.

Starter activity

Use mental calculation activities to refresh your pupils' memory and skill at number work. Ask questions involving simple addition and subtraction as well as multiplication and division facts.

Lesson focus

The focus of this lesson is on calculating with units of mass. Read through the introductory text, and work through the worked examples with your class. It is important to work through the examples carefully for all the operations, making sure that all your pupils understand the various methods.

Encourage them to verbalise various strategies to solve the problems before deciding on a specific strategy.

Guide pupils to revise the conversion of kilograms to grams 1 kg = 1 000 g and 1 g = 0.001 kg.

Lead pupils to solve problems using multiplication and division of weights.

Answers

Exercise 1

1. **a)** 10 kg 203 g; **b)** 75 kg 700 g; **c)** 17 kg 300 g; **d)** 51 kg; **e)** 84.8 kg; **f)** 263.88 kg
2. **a)** 69 kg 420 g; **b)** 175 kg; **c)** 128.61 kg

Workbook

1. **a)** 25; **b)** 5; **c)** –27; **d)** 32; **e)** 30; **f)** 9.56; **g)** 56; **h)** 2,15; **i)** 12; **j)** 18; **k)** 56; **l)** 4
2. **a)** 315; **b)** 320; **c)** 266; **d)** 84

Assessment

Pupils should be able to multiply weight by whole numbers correctly and solve problems on multiplication of weight.

Extension activity

Pupils who have proved they understand the concepts can be put in groups to make up their own multiplication problems with weight for the group to do.

Homework activity

Pupils are to complete question 1 and 2 on page 41 of the WB.

Lesson 2   *Pupil's Book pages 154 and 155; Workbook page 42*

Preparation

You will need to have:
- Place value table
- Decimal chart showing division
- Chart showing division of kg and g
- Times table chart.

Starter activity

Write division sums on the board using whole numbers and ask a pupil to come up and circle the dividend and another pupil to circle the divisor. Write the labels below each circle.

Lesson focus

Read through the rules on how best to divide weight. Make sure that pupils understand which number is the dividend and which is the divisor. Work through the example as a class and explain why the division starts with the kilograms to any pupils who are unsure.

Pupils can then complete Exercise 2 on their own.

Answers

Exercise 2

1. **a)** 7 kg 167 g; **b)** 4 kg 750 g; **c)** 3 kg 356 g; **d)** 3.41 kg; **e)** 2 kg 247 g; **f)** 3 kg 729 g
2. **a)** 551 g; **b)** 3.75 kg; **c)** 211 bags

Workbook

3. **a)** 12; **b)** 33; **c)** 19; **d)** 53
4. 4.5 kg

Assessment

Pupils should be able to divide weight by whole numbers correctly and solve problems on division of weight.

Extension activity
Pupils who have proved they understand the concepts can be put in to groups to make up their own division problems with weight for the group to do.

Homework activity
Pupils are to complete questions 3 and 4 on page 42 of the WB.

Lesson 3   *Pupil's Book pages 156; Workbook page 42*

⚙ **Preparation**
You will need to have:
• The answers to the Revision exercise to hand.

🔍 **Lesson focus**
Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📚 **Answers**

Revision exercise
1. **a)** 65 kg 750 g; **b)** 43 kg 830 g; **c)** 289.89 kg;
    d) 205.76 kg; **e)** 49 kg 830 g; **f)** 8 kg 450 g;
    g) 21.2 kg; **h)** 5.6815 kg
2. **a)** 64 kg; **b)** 233.1 kg; **c)** 128.61 kg; **d)** 4 days

Workbook
5.

Description	Quantity bought	Package weight	Total weight kg
Maize meal	20	7 kg	140
Rice	40	2 kg	80
Salt	200	500 g	100
Flour	30	5 kg	150
Coffee	10	1 kg	10
Soap powder	40	1.5 kg	60
Sugar	20	3 kg	60
Total weight in kg			600 kg

Assessment
Pupils should be able to multiply and divide decimal numbers.

Understand how to apply this to working with grams and kilograms.

Observe pupils' response during lessons and look at their answers to the exercises.

Homework activity
All pupils must convert the following to grams and divide the result by 5:
5 kg 100 g; 6 kg 100 g; 7 kg 5 g

Pupils are then to complete question 5 on page 42 of the WB.

Objectives

By the end of this unit, each pupil should be able to:
- Tell the time in hours and minutes
- Know when to use the notations a.m. and p.m.
- Read a calendar and write dates
- Solve quantitative reasoning problems related to time.

🔧 Suggested resources

Cardboard clocks; Other different types of clocks; Current calendar; Supplies such as cardboard, pins and scissors.

abc Key word definitions

notations: a symbol used to represent something
dawn: the first light in the sky after the night
noon: midday
ante meridian: the time after midnight but before midday
post meridian: the time past midday up to midnight

💬 Frequently asked questions

Q *What prior knowledge do the pupils need?*
A Pupils:
- will need to be familiar with analogue and digital clock faces and be able to tell the time to the nearest five minutes on both analogue and digital clocks
- should have an awareness of events related to dates and times and months, for example religious holidays, national holidays and so on
- should be able to calculate the duration of time in hours, half hours, quarter hours, in days, weeks and months
- need to have a good concept of time and how long a second, a minute and an hour are.

📝 Evaluation guide

Pupils to:
1. Give time on a clock or calendar.
2. Indicate important activities at their homes and times when they take place.
3. Write the dates of some given important dates.
4. Solve quantitative aptitude problems involving time.
5. Record three important times of the (school) day and the activities associated with them indicating which times are a.m. and p.m.

Lesson 1   *Pupil's Book page 157*

⚙️ Preparation

You will need to have:
- Cardboard clock
- Cardboard, pins, scissors.

➲ Starter activity

Develop your pupils' sense of the passage of time by timing them doing various activities, for example count to 20 in ones; counting to 100 in ones. Challenge them to hop as many times as they can on one leg during 30 seconds; one minute, and so on.

🔍 Lesson focus

When introducing this unit, ask your pupils to look at the analogue clock faces very carefully. Point out to them that each little line between the longer lines indicates a minute. Encourage them to count the minutes as they point to them on the clock face. Explain that we read a digital clock according to the figures on the display. Be careful to explain how the reading of time from a digital clock works

after 30 minutes, for example that twenty to six will become six forty, meaning that this is forty minutes past 6 o'clock.

Remember that pupils who are learning through the medium of a second language will need more time to assimilate this description. Once you are confident that your pupils understand these concepts, ask them to do Exercise 1.

📚 Answers

Exercise 1

1. Clock times to be shown:
    a) 11.30; **b)** 1.15; **c)** 4.15; **d)** 1.30; **e)** 4.45;
    f) 11.45; **g)** 3.30; **h)** 9.45

Assessment

Pupils should be able to read the time on an analogue clock in hours and minutes.

Extension activity

Ask pupils to draw analogue clocks showing the following times: 11:37   12:12   07:41   01:27

Lesson 2 *Pupil's Book pages 157 to 159; Workbook pages 43 and 44*

⚙️ Preparation

You will need to have:
•   Different types of clocks.

➡️ Starter activity

Have a discussion in class about different activities and the length of time that it takes to complete each activity. Include activities like sport events, activities at home and activities at school. Record the different units of time that are mentioned. Discuss the recorded units of time to establish what pupils know about these units.

🔍 Lesson focus

Revise the division of the clock face into 12 hours, and each hour into 60 minutes. Work through the worked example and introduce pupils to digital clock display. If possible, pass around some digital clocks in the classroom.

📚 Answers

Exercise 2

1. **a)** 12:41; **b)** 09:25; **c)** 04:10; **d)** 05:50;
    e) 08:48; **f)** 08:20
2. Clock faces should show the following times:
    a) 9:12; **b)** 12:08; **c)** 11:38; **d)** 5:52; **e)** 5:48;
    f) 9:28

Workbook

1. **a)** 12:25; **b)** 05:40; **c)** 08:55; **d)** 10:15;
    e) 11:54; **f)** 01:42
2. Digital and analogue clocks showing the following times: **a)** 12:25; **b)** 1:45; **c)** 7:08;
    d) 3:30; **e)** 3:50; **f)** 12:10

Assessment

Pupils should be able to read time on both analogue and digital clocks.

Extension activity

Go back to Exercise 1 and 2 and ask pupils to draw the times using a digital clock face.

Homework activity

Pupils are to complete questions 1 and 2 on pages 43 and 44 of the WB.

Lesson 3 *Pupil's Book pages 159 to 161; Workbook page 45*

⚙️ Preparation

You will need to have:
•   A digital and an analogue clock.

➡️ Starter activity

Ask pupils to list different activities that they do throughout the day, such as waking up, doing homework, playing with friends, eating supper, and so on. Divide the board in half and write "Before midday" and "After midday" at the top of each half. Pupils must come up and write their activity in the section of time they perform it.

🔍 Lesson focus

Explain what midday means and draw or show a clock showing midday, 12:00. We use a.m. after a time to indicate that it is before midday, and we use p.m. after a time to indicate it is after midday. Continue this discussion by asking pupils to come up to the board and writing the digital time of each activity they listed in the Starter activity. They must also write am or pm after the time, depending on which side of the midday line it is written.

Pupils can complete Exercise 3.

📖 Answers

Exercise 3

1. **a)** 7:30 a:m; **b)** 3:00 pm; **c)** 2:30 pm;
   d) 4:00 pm; **e)** 9:00 pm
2. **a)** 8:15 am; **b)** 6:05 pm; **c)** 8:10 am;
   d) 9:42 pm; **e)** 12:30 pm
3. **a)** Seven o'clock in the morning; **b)** Half past 1 in the afternoon; **c)** Twenty past three in the morning; **d)** Quarter to two in the morning; **e)** Twenty to eleven at night; **f)** Twenty five to ten at night
4. **a)** 7:00 am; **b)** 4:00 am; **c)** 6:00 pm; **d)** 10:00 pm

Workbook

3. d), c), a), b); **4. a)** 08:15; **b)** 10:30; **c)** 10:30; **d)** same opponent

> **Assessment**
>
> Pupils should be able to use a.m. and p.m. notation correctly.

> **Homework activity**
>
> Pupils are to complete questions 3 and 4 on page 45 of the WB.

Lesson 4   *Pupil's Book pages 161 and 162;*
Workbook page 46

⚙️ Preparation

You will need to have:
* A current calendar.

➲ Starter activity

Divide your class into groups for this activity. Ask each group to prepare a short role play, based on the following theme: "What would a day at school be like if we had no idea of the time?" Give them some time to discuss their ideas in their groups, and then ask each group in turn to perform their role play in front of the class.

🔍 Lesson focus

Recite together the days of the week, and then the months of the year. When we write a date, there are three parts: the day, the month and the year, for example 21 September 2014. Write this example on the board and label the day, month and year below. Ask pupils to write the date of their birthday and offer guidance as needed.

Pupils can complete Exercise 4.

📖 Answers

Exercise 4

1. **a)** 1 month ends on a Saturday; **b)** 2 months begin on a Wednesday
2. **a)** January 26 is a Sunday; **b)** July 15 is a Tuesday; **c)** May 27 is a Tuesday; **d)** October 1 is a Wednesday; **e)** December 20 is a Saturday **f)** August 17 is a Sunday
3. **a)** The first week; **b)** January, May, August and October; **c)** March, June August and November
4. 1 September
5. 5 May

Challenge

1. 6 months; **2.** 4 months 1 week; **3.** 14 months 2 weeks; **4.** 27 months

Workbook

7. Ruth: 112, Esther: 138, Hannah: 119, Naomi: 123

> **Assessment**
>
> Pupils should be able to read and write dates correctly.

Extension activity

As an extension activity, pupils can attempt to do the **Challenge** on page 162 of the PB.

Homework activity

Pupils are to complete question 7 on page 46 of the WB.

Lesson 5 *Pupil's Book pages 162*

⚙ Preparation

You will need to have:
- The answers to the Quantitative reasoning exercise to hand.

🔍 Lesson focus

Write all the months of the year on the board. Without looking at a calendar, pupils must say if a month has 30 or 31 days. Which month is left over and how many days are in that month? Use the remaining time to consolidate writing dates correctly.

Pupils can complete Exercise 5.

📖 Answers

Exercise 5

1. **a)** 4:00 am; **b)** 9:00 am; **c)** 4:00 pm;
   d) 11:00 pm; **e)** 4:00 pm

> **Assessment**
>
> Observe pupils during the lesson and check their answers to Exercise 5.

Lesson 6 *Pupil's Book pages 163; Workbook pages 45 and 46*

⚙ Preparation

You will need to have:
- The answers to the Revision exercise to hand.

🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 Answers

Revision exercise

1. Clock faces showing the following times:
   a) 4:32; **b)** 9:15; **c)** 2:22; **d)** 3:46
2. **a)** Eleven in the morning; **b)** Ten past six in the evening; **c)** Three minutes past four in the morning; **d)** Twenty five past eleven at night
3. **a)** 8:15 am; **b)** 7:30 pm; **c)** 6:40 am;
   d) 11:35 pm
4. **a)** 1 month; **b)** 3 months; **c)** 365 days
   d) i) 4 months; **ii)** 5 months; **iii)** 4 months

Workbook

5. **a)** 60; **b)** 60; **c)** 24; **d)** 12; **e)** 96; **f)** 300;
   g) 600; **h)** 840; **i)** 21
6. **a)** 120; **b)** 31; **c)** 3

> **Assessment**
>
> Observe pupils as they complete the revision exercise and offer guidance as needed. Pupils should be able to read and write analogue and digital time. Pupils should be able to use a.m. and p.m. notation correctly, and be able to read and write dates.

Extension activity

Pupils who have proved they understand the concept should be encouraged to draw up weekly timetables to show their own afternoon programs. This must include getting home, having lunch, extra mural activities, homework, and the likes.

Homework activity

Pupils are to complete questions 5 and 6 on pages 45 and 46 of the WB.

Unit 26 | Introducing area

Objectives

By the end of this unit, each pupil should be able to:
- Find the area of rectangles and squares
- Find the area of shapes that can be divided into rectangles and squares
- Solve quantitative aptitude problems involving area.

🔧 Suggested resources

6 cm² paper sheets; Objects made up of a rectangle and a square, or two rectangles.

abc Key word definitions

area: the size of a 2-dimensional surface
square units: area is measured in square units
row: on a table the horizontals are the rows
column: on a table the verticals are the columns
estimate: an educated guess, or a rough judgment
polygon: a two dimensional shape with straight sides

💬 Frequently asked questions

Q *What prior knowledge do the pupils need?*
A Pupils need to be able to:
- distinguish the surface area from other aspects of a shape, for example the angles or the length of the sides
- estimate, find and compare the area of plain shapes on grid paper.

Q *Is it important to ask pupils to find the area of irregular shapes?*
A It is important that pupils find the area of irregular objects. This relates particularly to the application of calculating area in everyday life. Pupils will often be confronted with irregular shapes and it will be useful for them to have developed strategies for finding the area of these shapes. This kind of activity also encourages pupils to develop their problem solving skills.

✗ Common errors that pupils make

Pupils sometimes ignore square units that are partly shaded and count only those square units that are fully shaded. The most likely cause of this is that these pupils are unsure about how to award a value to a partially shaded square unit. Show them that a square unit that is shaded on one side of a diagonal has a value of $\frac{1}{2}$ a square unit.

Pupils often forget to write the units in their answers. You will need to keep reminding your pupils to write the units.

✏️ Evaluation guide

Pupils to:
1. Find areas using formulae.

Lesson 1	*Pupil's Book pages 164–166; Workbook pages 48 and 49*

⚙️ Preparation

You will need to have:
- 6 cm² paper sheets.

➲ Starter activity

Ask your pupils to work in pairs for this activity. Give each pair 12 or more cardboard square centimetres. Ask them to make as many different squares and rectangles as possible. They should draw their shapes on centimetre square grid paper. Discuss these shapes with your class. Ask questions like: "Are all the shapes the same size? Are some shapes bigger or smaller than other shapes? How do you know if a shape is bigger or smaller than

another shape?" Go on to ask them to build other shapes besides squares and rectangles.

🔍 Lesson focus

Read through the introductory text and work through the worked examples with your pupils. As this is basically revision work, your pupils should cope with it quite easily.

Ask the class to do Exercise 1 pointing out that in question 1 the measurements are given for the length and the breadth. The patterns have nothing to do with the measurements.

📖 Answers

Exercise 1

1. **a)** 42 cm²; **b)** 20 cm²

2. **a)**

Length	Breadth	Area
12 cm	9 cm	108 cm²
21 cm	6 cm	126 cm²
60 cm	30 cm	1800 cm²
18 cm	9 cm	162 cm²

b)

Length of sides	Area
6 cm	36 cm²
30 cm	900 cm²
15 cm	225 cm²
25 cm	625 cm²

3. **a)** 40 cm²; **b)** 336 cm²; **c)** 72.25 cm²; **d)** 324 cm²

Workbook

2. **a)** 16; **b)** 9; **c)** 12
3. Pupils' own rectangles measuring 3 × 5 squares.
4. **a)** 15 cm²; **b)** 12 cm²; **c)** 16 cm²
6. 8 050 m²

Assessment

Pupils should be able to find the areas of rectangles and squares.

Extension activity
Pupils can complete the **Challenge** on page 166.

Homework activity
Pupils are to complete questions 2–6 on pages 48 and 49 of the WB.

Lesson 2   *Pupil's Book pages 166–168; Workbook pages 47 and 49*

⚙️ Preparation

You will need to have:
- Objects made up of a rectangle and a square, or two rectangles.

➲ Starter activity

Discuss the shapes on page 166 in the PB with your class. Ask them to suggest ways of calculating the areas of the different shapes.

Allow some pupils to demonstrate on the board how they would calculate the answers.

🔍 Lesson focus

Read through the Solution on page 167 with your class. Give pupils the opportunity to ask questions and then ask them to do Exercise 2.

📖 Answers

Exercise 2

1. **a)** (8 × 3) + (4 × 3.5) + (4 × 8) = 70 cm²
   b) (18 × 2.5) + (6 × 3) + (6 × 3) = 99 cm²
   c) 34.2 + 21 = 55.2 cm²
   d) 28 + 28 + 15 = 71 cm²
2. Pupils draw rectangles of the dimensions listed in question 3.
3. 4 rectangles of dimensions 1 × 36 cm, 2 × 18 cm, 3 × 12 cm, and 4 × 9 cm.
4. Perimeter of rectangle 1 × 36 cm: = 74 cm
   Perimeter of rectangle 2 × 18 cm: = 40 cm
   Perimeter of rectangle 3 × 12 cm: = 30 cm
   Perimeter of rectangle 4 × 9 cm: = 26 cm

Workbook

1. **a)** 7 cm²; **b)** 8 cm²; **c)** 10 cm²; **d)** 4 cm²
7. 33 cm²

Extension activity

Tell pupils that the perimeter of a square is 28 cm and ask them to find the area of the square. Repeat with a square of perimeter 12 cm, 32 cm, 40 cm and 1 m.

Homework activity

Pupils are to complete questions 1 and 7 on pages 47 and 49 of the WB.

Lesson 3   *Pupil's Book pages 168–169*

⚙ **Preparation**

You will need to have:
• The answers to the Quantitative reasoning exercise to hand.

⮕ **Starter activity**

Ask your pupils once more to work in pairs for this activity. Let them discuss what they think is required in Exercise 3.

🔍 **Lesson focus**

Ask individual pupils to volunteer to tell the class what they think the focus is of the lesson. Discuss the summary in the PB on page 169.

Looking at the example, encourage pupils to ask questions and make suggestions. Describe how the required measurements are calculated. In the first example, the given length is 4 cm and the given breadth is 2 cm, so the area is 2 cm × 4 cm = 8 cm^2.

Ask pupils to do Exercise 3.

📖 **Answers**

Exercise 3

1. **a)** 24 cm^2; **b)** 17.64 cm^2; **c)** 4.762 cm;
   d) 24 cm; **e)** 10 cm; **f)** 8 cm

Lesson 4   *Pupil's Book page 169*

⚙ **Preparation**

You will need to have:
• The answers to the Revision exercise to hand.

🔍 **Lesson focus**

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 **Answers**

Revision exercise

1. **a)** 96 cm^2; **b)** 49 cm^2; **c)** 51 cm^2; **d)** 133 cm^2
2. **a)** 40 m^2; **b)** 100 m × 65 m = 6 500 m^2

Homework activity

Pupils who have not completed the set work, should complete it for homework.

All pupils must measure the length and breadth of at least three rectangular shapes and calculate the areas.

Objectives

By the end of this unit, each pupil should be able to:

- Calculate the area of farmlands, towns and cities in square kilometres (km^2)
- Read and write area in square metres (m^2)
- Measure large areas like buildings in square metres (m^2)
- Solve problems relating to area.

🔧 Suggested resources

Area and m^2 diagrams on grid paper; Grid paper with floor plans of the classroom, school grounds and a farm land; Overhead projector, transparency sheets; Cardboard and unit square chart; Measuring tapes.

abc Key word definitions

dimensions: measurements

✗ Common errors that pupils make

Pupils often forget to write the units in their answers. For example in question 1 of Exercise 3 it is of the greatest importance to specify whether the answers are cm^2 or cm, or m^2 or m. You will need to keep reminding your pupils to write the units. Explain that an answer of 10 is meaningless if the answer should actually be 10 m^2 or 10 seconds or 10 oranges.

✏️ Evaluation guide

Pupils to:
1. Find large areas in square metres and hectares.

Lesson 1   *Pupil's Book page 170; Workbook page 50*

⚙️ Preparation

You will need to have:
- Area and m^2 diagrams on grid paper
- Grid paper with floor plans of the classroom, school grounds and a farm land
- Measuring tapes.

➲ Starter activity

Ask your pupils to work in small groups of about three for this activity. Give each group a measuring tape. One member measures, the second writes down the measurement and the third calculates the area. Ask them to measure as many different squares and rectangles as possible. The measurements must be in metres, so they must measure things like a desk top, carpet, door, floor or wall.

🔍 Lesson focus

Put pupils into groups and assign each pupil a specific task. After the group has measured, noted and calculated two areas, the pupils will swap tasks. Each pupil should have the chance to measure, note down and calculate. Measurement must be done in metres. Demonstrate an example on the board, for example, a door is 2.1 m high and 0.9 m wide. The area is $2.1 \times 0.9 = 1.89$ m^2

Ask your class to do Exercise 1 questions 1–4, pointing out that in each question they should first estimate the area of each shape as closely as possible.

📚 Answers

Exercise 1

1. 25.2 m^2; **2.** 6 500 m^2; **3.** 10 000 m^2; **4.** 21 m

Workbook

2. b) 416; **d)** 326; **3. a)** 35; **c)** 78; **4. b)** 288; **d)** 180

Assessment

Pupils should be able to calculate areas of farmlands, towns and cities using the appropriate units.

Lesson 2 *Pupil's Book page 171; Workbook page 50*

⚙ Preparation

You will need to have:
- Area and m² diagrams on grid paper
- Grid paper with floor plans of the classroom, school grounds and a farm land
- Measuring tapes.

➲ Starter activity

Ask your pupils to work individually on this exercise. They should each do a drawing similar to the one of Jumai's compound on page 171 of the PB. The pupils drawing must be of their own home and garden. As far as possible they should try to estimate the right measurements.

🔍 Lesson focus

Discuss hectares (ha) with the pupils. 1 000 m² = 1 ha. Give them the opportunity to ask you any questions that they might have.

Ask your class to do questions 5–7 of Exercise 1 on page 171 of the PB pointing out that in each question they should estimate the area of each shape as closely as possible before calculating the answer accurately.

📘 Answers

Exercise 1

5. 20 000 m²; **6.** 1 ha
7. Blue: 6 000 km², Green: 3 400 km²

Workbook

1. a) 10 000; **b)** 30 000; **c)** 5; **2. a)** 141; **c)** 41;
3. b) 107; **d)** 155; **4. a)** 175; **c)** 142

> **Assessment**
> Pupils should be able to calculate areas of farmlands, towns and cities using the appropriate units.

Lesson 3 *Pupil's Book page 172; Workbook pages 50 and 51*

⚙ Preparation

You will need to have:
- The answers to the Revision exercise to hand.

🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📘 Answers

Revision exercise

1. 20 000 m²
2. **a)** 4 800 m²; **b)** 200 m²; **c)** 4 600 m²
3. **a)** Square and rectangle; **b)** The rectangle looks larger. The length on the square marked 4 m is equal to the length on rectangle marked 2 m. The scales are different.; **c)** The square = 16 m². The rectangle = 16 m². Both have the same area.

Workbook

5. 6; **7. a)** 0.4; **b)** 4 000; **8.** 1 160 ha; **9.** 11.3436 ha

> **Assessment**
> Mark the assessments, taking note of where individual pupils have not met the unit objectives, in order to give these pupils additional teaching input where required.

> **Homework activity**
> Pupils are to complete questions 5–9 on pages 50 and 51 of the WB.

Objectives

By the end of this unit, each pupil should be able to:
- Add and subtract in litres and millilitres
- Solve problems on addition and subtraction involving litres
- Measure, compare, order and estimate capacity
- Calculate using litres and millilitres.

Suggested resources

Variety of containers (milk, yoghurt, juice) of water and/or sand; Measuring cups, jugs, cylinders; Plastic bottles; Teaspoons; Containers that can hold 250 ml, 500 ml and 1 litre; Cardboard.

abc Key word definitions

capacity: how much a container can hold
liquid: fluid, water
litre: a measure of liquid
millilitre: a small measure of liquid
measuring jug: a container to measure

Frequently asked questions

Q   What prior knowledge do the pupils need?
A   Pupils need:
- to have an understanding of litres and millilitres
- to be able to do simple calculations
- reading interpretation skills for problem solving
- to know what estimation is.

Q   Are capacity and volume the same thing?
A   No, although they are closely related concepts. Capacity is the amount that a container can hold. Volume is the amount of space taken up by an object.

Common errors that pupils make

Pupils find it difficult to read off the measurement from a measuring jug/cylinder. It is important to explain carefully how to measure the amount of liquid in a measuring jug or cylinder.

Ensure that the pupils are aware that they should take the error of parallax into account. It is not necessary for them to know the name of this concept at this stage, but it is important that you teach them the concept if they are to measure correctly.

Pupils read the capacities on pictures of measuring jugs incorrectly. It is vital that pupils should examine each measuring jug carefully in order to be able to work out the scale, especially if the level of the liquid in a jug does not lie exactly on a marked division. Help the pupils who struggle with this skill by drawing examples of your own on the board. Work through one or two of these examples, and then ask the pupils to do the remaining examples on their own.

Evaluation guide

Pupils to:
1. Add and subtract given problems in litres.

Lesson 1

Preparation

You will need to have:
- Graduated containers, such as measuring jugs, of different capacities
- Bucket of water.

Starter activity

Show the different containers to the pupils and ask them to read off the capacity of each measuring jug. Ask pupils if they can explain how to measure liquid accurately.

🔍 Lesson focus

This is a practical lesson to teach pupils how to measure capacity accurately. Demonstrate the steps below to the class. Then allow pupils to work in pairs to practice measuring.

1. Place the container of liquid on a flat, horizontal surface (such as a table).
2. Wait a few seconds for the surface of the liquid to stop moving.
3. Move your head so that you can see the scale clearly and your eyes are level with the top of the liquid.
4. Calculate how many millimetres each unmarked division on the scale represents.
5. Read the scale.
6. Write down your reading straight away.
7. Ask someone else to check your reading or check it yourself.

Assessment

Pupils should be able to accurately measure and read liquid capacities.

Lesson 2   *Pupil's Book pages 173 and 174; Workbook pages 52 and 53*

⚙️ Preparation

You will need to have:
- Variety of containers (milk, yoghurt, juice) of water and/or sand
- Measuring cups, jugs, cylinders
- Plastic bottles
- Teaspoons
- Containers that can hold 250 ml, 500 ml and 1 litre
- Chart showing conversion of litres and millilitres to litres
- Cardboard.

➲ Starter activity

Collect a variety of containers on which the capacity is clearly indicated. Ask your pupils to order the containers from those that hold the most to those that hold the least, and vice versa. Ask pupils to classify the containers into two basic groups, namely 'small' and 'large'. Containers that do not fit into either of the categories could be the source of interesting discussion.

Pupils should have the opportunity to handle the different containers as much as possible to build the concept of capacity. Ensure that pupils are stimulated to be aware of capacity in the classroom and in the world around them.

🔍 Lesson focus

In this unit, your pupils will work with the basic units of capacity. Have a class discussion about why we need both the units of litre and millilitre. It could be useful to collect a number of pictures that show containers with capacity indicated on them.

Make a poster for your classroom and discuss the poster with your pupils. Encourage them to notice capacity in the world around them. The exercises have been structured to progress from familiar concepts to less familiar ones. It is therefore important to go through this unit exercise by exercise.

Pupils will also need the chance to verbalise their learning as much as possible to come to grips with the concepts in the unit.

In Lesson 1, work through the notes on page 173 and 174 to ensure pupils can convert, estimate and measure capacity thus further developing the concept of litres and millilitres. It is important that you spend enough time with your pupils on this lesson. They should develop a very sound concept of how much a litre of liquid is and how small an amount a millilitre is. Pupils should be encouraged to estimate wherever possible and then to assess their estimation once they have established the answer.

The focus of this lesson is to revise units of capacity learnt in Primary 3 and to ensure pupils are comfortable with converting between millilitres and litres. Practical application is best for this.

📚 Answers

Workbook

1. Pupils' own answers.
2. **a)** 500 ml; **b)** 250 ml; **c)** 400 ml; **d)** 100 ml; **e)** 50 ml

Assessment

Pupils should be able to discern between millilitres and litres and order volumes of liquid accordingly.

Homework activity

Pupils should complete questions 1 and 2 on pages 52 and 53 of the WB.

Lesson 3 *Pupil's Book pages 174 and 175; Workbook page 53*

⚙ Preparation

You will need to have:
- Charts showing addition and subtraction of decimal numbers
- Chart showing conversion of litres and millilitres to litres
- Place value table.

⮕ Starter activity

Revise decimal point addition and subtraction by putting a few sums up on the board with up to two decimal points. Write the numbers in the sums above on another, but purposefully do not align the digits and decimal points. Emphasise the importance of lining up the decimal points first, before calculating the answers. Use a place value table to help pupils line up the numbers correctly.

🔍 Lesson focus

Discuss the examples of addition and subtraction on page 174 of the PB.

The focus of this lesson is on comparing and ordering capacities. Read through the introductory text with your class, making sure that all the pupils understand how to compare the capacity of two different containers in a practical way.

Ask the pupils to complete Exercise 1.

📖 Answers

Exercise 1

1. a) 24.307 ℓ; **b)** 11.783 ℓ; **c)** 23.714 ℓ; **d)** 2.67 ℓ; **e)** 5.598 ℓ; **f)** 20.628 ℓ; **2.** 18.1 ℓ; **3.** 15.150 ℓ; **4.** 173.37 ℓ

Workbook

3. a) 750 ml; **b)** 600 ml; **c)** 500 ml; **d)** 1 350 ml
4. a) 260 ml; **b)** 660 ml; **c)** 124 ml; **d)** 386 ml

Assessment

Pupils should be able to add and subtract in millilitres and litres.

Homework activity

Pupils to complete questions 3 and 4 on page 53 of the WB.

Lesson 4 *Pupil's Book pages 175 and 176*

⚙ Preparation

You will need to have:
- The answers to the Quantitative reasoning exercise to hand.

🔍 Lesson focus

Look at the two example patterns given and allow pupils some time to work out the relationship on their own. Ask pupils to come and write the pattern for each diagram on the board. Once all pupils grasp the concept and the pattern, they can complete Exercise 2.

📖 Answers

Exercise 2

1. 30.47 ℓ; **2.** 7.49 ℓ; **3.** 25.5 ℓ; **4.** 10.91 ℓ; **5.** 14.66 ℓ; **6.** 43.9 ℓ

Assessment

Observe pupils as they complete Exercise 2. At random, ask a pupil to explain the pattern in one of the shapes. Check that their addition and subtraction is accurate, especially around the decimal point.

Lesson 5   *Pupil's Book page 176; Workbook page 53*

⚙ Preparation

You will need to have:
- The answers to the Revision exercise to hand.

🔍 Lesson focus

Pupils revise the concepts covered in this unit by going over the summary and completing the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 Answers

Revision exercise

1. a) 74.114 ℓ; **b)** 106.667 ℓ; **c)** 38.762 ℓ;
d) 28.876 ℓ; **2.** 231 ℓ of fuel; **3.** 1 091.625 ℓ

Challenge

Some examples are:
75 + 25 + 20 + 15 = 135 ℓ
45 + 45 + 25 + 20 = 135 ℓ
50 + 45 + 15 + 25 = 135 ℓ

Workbook

5. 2.365 ℓ; **6.** 255 ml; **7.** 186 ℓ

Assessment

This unit assessment gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit. You should give pupils a set time in which to complete the assessment. Most pupils should be able to achieve their maximum score in about 40 minutes. Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment. When the time is up, take in the pupils' answers. If you have time at the end of the lesson, you could discuss some or all of the questions.

Pupils should be able to add and subtract using capacity.

They should also be able to find combinations of capacities that will make up a given total capacity.

They should be able to solve word problems involving capacity.

Observe pupils' responses during lesson and look at their answers to the exercises.

Unit 29 Multiplying and dividing litres

🔧 Suggested resources

Charts showing multiplication and division of decimal numbers; Chart showing conversion of litres and millilitres to litres; Cardboard.

abc Key word definitions

place value: the value of a digit based on its position in a number

volume: the amount of space taken up by an object or substance

convert: change, for example, convert litres to millilitres

💬 Frequently asked questions

Q *How can pupils check that their answers to calculations are correct?*

A Remind pupils to use the inverse operation to check that they have calculated correctly. For example:

$17 + 19 = 36$ Test: $36 - 19 = 17$
$13 \times 3 = 39$ Test: $39 \div 3 = 13$

✗ Common errors that pupils make

Pupils may be tempted to multiply or divide litres and millilitres. Pupils should once more be made aware that with all measurements we may only calculate amounts with like units.

Pupils write the wrong units in their answers, or forget to write the units altogether. If pupils are still making this error, explain that you will no longer accept answers written without units, or with the wrong units. Ask them to correct their work for homework, making sure to concentrate on what units they should write.

✏️ Evaluation guide

Pupils to:
1. Divide and multiply with whole numbers in problems involving litres.
2. Solve problems on quantitative aptitude on multiplication and division involving litres.

Lesson 1   *Pupil's Book pages 177 and 178; Workbook page 54*

⚙️ Preparation

You will need to have:
- Charts showing multiplication and division of decimal numbers
- Chart showing conversion of litres and millilitres to litres.

➲ Starter activity

Work through the multiplication examples in the PB. Demonstrate an example on the board and then invite two or three volunteers to do examples on the board.

🔍 Lesson focus

Read the introductory page on the multiplication of litres on page 177 in the PB. Remind pupils that multiplication is done the same way as multiplying decimals. Place value must be maintained.

In this lesson, the focus is on calculating with units of capacity. Stress that one can only multiply and

divide capacities if the numbers are in the correct place value column. Explain that this is no different from decimal numbers. Work through the worked examples with your class, making sure that all your pupils are following the different methods.

📖 Answers

Exercise 1
1. **a)** 7.36 ℓ; **b)** 59.68 ℓ; **c)** 173.95 ℓ; **d)** 185.20 ℓ; **e)** 185.402 ℓ; **f)** 132.184 ℓ
2. 52.608 ℓ; **3.** 54.6 ℓ

Challenge
1. 2 ℓ; **2.** 60 ℓ; **3.** 730 ℓ

Workbook
1. **a)** 315 ℓ; **b)** 624 ml; **c)** 750 ℓ; **d)** 1 272 ml

> **Assessment**
> Pupils should be able to multiply litres and give their answers in the correct units.

> **Extension activity**
> Pupils can complete the **Challenge** on page 178.

> **Homework activity**
> Pupils should complete question 1 on page 54 of the WB.

| **Lesson 2** | *Pupil's Book page 178; Workbook page 54* |

⚙️ Preparation
You will need to have:
- Charts showing multiplication and division of decimal numbers
- Chart showing conversion of litres and millilitres to litres.

➡️ Starter activity
Ask some pupils to volunteer to do simple long division examples using decimal numbers on the board. An example could be 6.75 ÷ 5. Discuss the method used.

Next, work through the examples on page 178 with your pupils.

🔍 Lesson focus
In this lesson, the focus is once more on calculating with units of capacity. Stress that division of capacities can only be done if the numbers are in the correct place value columns.

Ask the pupils to complete Exercise 2.

📖 Answers

Exercise 2
1. **a)** 3.08 ℓ; **b)** 5.11025 ℓ; **c)** 9.7 ℓ; **d)** 4.315 ℓ; **e)** 2.85 ℓ; **f)** 3.568 ℓ
2. 24.6 ℓ; **3.** 9.33 ℓ

Workbook
2. **a)** 151 ℓ; **b)** 90 ml; **c)** 24 ℓ; **d)** 32 ml

> **Assessment**
> Pupils should be able to multiply litres and give their answers in the correct units.

> **Extension activity**
> Pupils who have proved they understand the concepts can be put in groups to make up their own multiplication and division problems with litres for the group to do.

> **Homework activity**
> Pupils should complete question 2 on page 54 of the WB.

| **Lesson 3** | *Pupil's Book page 179; Workbook page 54* |

⚙️ Preparation
You will need to have:
- The answers to the Quantitative reasoning exercise to hand.

Starter activity

Discuss the methods used in multiplication and division.

Examine the examples on page 179 with your pupils and discuss the 'patterns' used to multiply or divide. Pupils should try to work out whether the arrows mean multiplication or division.

Lesson focus

In this lesson, the focus is once more on calculating with units of capacity. Pupils must concentrate to work out how they have to apply their knowledge to the given numbers. Logic must be used.

Answers

Exercise 3

1. 43.60 ℓ; **2.** 3.2 ℓ; **3.** 1.669 ℓ; **4.** 11.959 ℓ; **5.** 13.6 ℓ; **6.** 11.76 ℓ

Workbook

5. a) 720 ℓ; **b)** 3 960 ml; **c)** 24 ml; **d)** 12 ℓ; **e)** 36 ml; **f)** 26; **g)** 3; **h)** 1 088 ℓ

> **Assessment**
>
> Pupils should be able to solve multiplication and division problems involving litres. Pupils should be able to correctly perform calculations with decimals.

> **Extension activity**
> Pupils can create their own picture problems, with one missing value, for a friend to solve.

> **Homework activity**
> Pupils should complete question 5 on page 54 of the WB.

Lesson 4   *Pupil's Book page 180; Workbook page 54*

Preparation

You will need to have:
- The answers to the Revision exercise to hand.

Starter activity

Revise multiplication and division of decimal numbers.

Encourage pupils working in pairs to do examples on the board.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and carefully monitor how they cope with integrating the content covered in this unit.

Answers

Revision exercise

1. a) 606.96 ℓ; **b)** 367.68 ℓ; **c)** 9.412 ℓ; **d)** 7.332 ℓ
2. 187.92 ℓ; **3. a)** 54.84 ℓ; **b)** 91.40 ℓ

Workbook

3. 4 500 ml; **4.** 72 ℓ; **6.** 300 ml; **7.** 27 days

> **Assessment**
>
> Pupils should be able to multiply and divide using capacity.
>
> They should be able to find combinations of capacities that will make up a given total capacity.
>
> They should also be able to solve word problems involving capacity.

> **Extension activity**
> Pupils write a list of ten situations in day-to-day life that use division or multiplication of litres.

> **Homework activity**
> Pupils should complete questions 3, 4, 6 and 7 on page 54 of the WB.

Objectives

By the end of this unit, each pupil should be able to:
- Identify and label three-dimensional shapes
- Distinguish between open and closed shapes
- Identify the uses of three-dimensional shapes in your environment.

🔧 Suggested resources

Wall charts with 3-D shapes, each named, clearly visible in the class; Boxes of many shapes and sizes; Spheres, balls and cylindrical containers; Models of all the different 3-D objects; Paper and cardboard, scissors, rulers, glue and tape; Angle testers; Plastic buckets.

abc Key word definitions

face: a flat surface of a 3-D object
edge: a line where two faces meet
vertex: the point where two or more edges meet
curve: a line that has no part that is straight or a surface that bends smoothly and evenly
cuboid: a polyhedron with six rectangular faces
cylinder: a solid object with two flat circular ends and one curved side

💬 Frequently asked questions

Q *What prior knowledge do pupils need?*
A Pupils should:
- recognise 3-D shapes in their environment. Some examples are buildings, books, lunch boxes and tin cans
- know how to identify and name the sphere, cube, cuboid, cylinder, cone, triangular prism and pyramid shapes
- be able to identify, count and describe faces, edges, corners and symmetry of 3-D shapes
- be able to create their own 3-D shapes and to solve problems and puzzles.

Q *How can I help my pupils to understand the new concepts?*

A Allow the pupils to use the new words as much as possible. They need to describe and draw the different shapes when they work with them.

Q *What link is there between 2-D shapes and 3-D objects?*
A The faces that make up 3-D objects are 2-D shapes.

✗ Common errors that pupils make

Pupils may confuse the names of objects. If this happens use the wall chart and the examples of 3-D shapes to clear the misunderstanding.

Pupils sometimes confuse a square-based pyramid and a triangular prism. Display a picture of an Egyptian pyramid in your classroom and use this as a reference point for a pyramid. Once your pupils have made this connection, they will not easily confuse a triangular prism with a pyramid.

✏️ Evaluation guide

Pupils to:
1. Distinguish between open and closed shapes from a given collection of shapes.

| Lesson 1	*Pupil's Book pages 181–182; Workbook page 55 and 56*

⚙️ Preparation

You will need to have:
- Wall charts with 3-D shapes, each named, clearly visible in the class
- Boxes of many shapes and sizes
- Spheres, balls and cylindrical containers
- Models of all the different 3-D objects.

Starter activity

Allow pupils to count the faces, edges and vertices on 3-D objects and then compare them to the drawings in the PB on page 182. Discuss the difference between open and closed shapes. Show examples of both.

Lesson focus

Prepare wall charts and matching 3-D objects so that pupils can grasp that the 2-D drawings represent 3-D objects.

Ask pupils to identify the 3-D objects in the example on page 181.

In this unit, your pupils will expand their existing knowledge of 3-D shapes. We reinforce the idea that a solid shape is made up of faces and that each face is a known plane shape. Make your pupils aware of 3-D shapes in their everyday world. This will make the link between mathematics and their everyday world. The work in this unit is developed in a logical sequence. We strongly recommend that you present the work in the order in which it appears in this unit. Read through the introductory text with the pupils. Ask them to relate each of the five everyday objects to its correct mathematical name (cylinder, cube, sphere, cuboid, triangular prism). Make sure that your pupils are comfortable with all the terminology used in this introductory text.

Ask pupils to work in pairs as they do Exercise 1. Allow them to discuss the different questions, but they should each write down their own answers.

Answers

Exercise 1

1.

Name	Number of faces	Number of vertices	Number of edges
Cylinder	3	0	2
Cuboid	6	8	12
Cube	6	8	12

Workbook

1. **a)** cube, pyramid on square base, right circular cone, sphere, triangular prism, cylinder, rectangular box with square cross section

b)–d) Pupils own answers.
2. **a)** E; **b)** B; **c)** A

> **Assessment**
>
> Pupils should be able to identify and name 3-dimensional shapes.

> **Extension activity**
>
> Ask pupils to make a table of 3-D objects. They must start by writing as many 3-D shapes that they know in the first column. In the second column, they must make a drawing of a real object with that shape.

> **Homework activity**
>
> Pupils to complete questions 1 and 2 on pages 55 and 56 of the WB.

Lesson 2   *Pupil's Book page 183*

Preparation

You will need to have:
*   Wall charts with 3-D shapes, each named, clearly visible in the class
*   Boxes of many shapes and sizes
*   Spheres, balls and cylindrical containers
*   Models of all the different 3-D objects.

Starter activity

Ask the pupils to identify open and closed 3-D shapes. Discuss how the shapes differ, for example how many faces, vertices and edges each has.

Then ask the pupils to cut open an empty cuboid shaped container and examine the basic pattern and how the 6 sides are related.
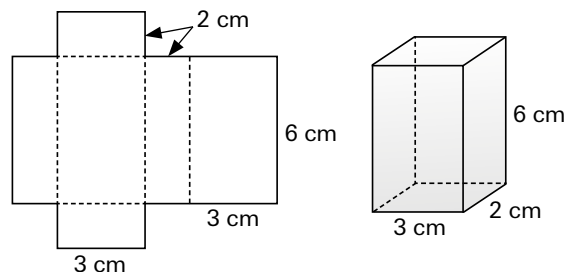
🔍 Lesson focus

Sort and compare 3-D shapes and ask your pupils to sort different 3-D shapes into groups, depending on their properties. They also compare different 3-D shapes, identifying the similarities and the differences between the shapes. In doing this, your pupils' understanding of the properties of different 3-D shapes is re-inforced.

📖 Answers

Exercise 2

1. **a)** Cuboid: 5; Cube: 5; Cylinder: 2
    b) Cuboid: 6; Cube: 6; Cylinder: 3
2. Check that pupils draw the correct shapes:
    a) Cone; **b)** Sphere; **c)** Square based pyramid;
    d) Cube; **e)** Cylinder; **f)** Cuboid

Challenge

Sketched flat plan of cuboid pattern showing measurements as given in PB on page 183.

Assessment

Pupils should be able to identify properties of 3-D shapes.

Support activity

If pupils struggle to complete Exercise 2, they may not understand the parts of a 3-D shape. Have pupils draw a 3-D cube and help them to write the labels of face, edge and vertex on their diagram. Pupils can refer to the diagram when they complete Exercise 2.

Homework activity

Pupils are to complete the **Challenge** lesson. As pupils construct a cuboid out of paper, they engage with 3-D shapes in a practical way. This practical work is very important, as it assists your pupils' conceptual development. Make sure that you give your pupils enough time to complete this work.

Lesson 3   *Pupil's Book page 184; Workbook page 57*

⚙️ Preparation

You will need to have:
*   Models of 3-D shapes
*   A glass or cup.

➲ Starter activity

Place a variety of models of 3-D shapes in a row on a flat surface that all your pupils can see clearly. Include a cone, a sphere, a cube, a cuboid, a pyramid and a cylinder, as well as any other shapes that you wish to add. Explain that each shape has advantages and disadvantages when used. Revise the names of the shapes, then ask your class questions like:

"Which shapes are suitable for rolling?" (sphere, cylinder, cone); "On which shapes could you safely balance a glass?" (cube, cuboid, cylinder); "Which shapes are suitable for stacking?" (cube, cuboid, cylinder); "If you stacked two cubes on top of one another, what shape would you get?" (cuboid); "If you stacked two cuboids on top of one another, what shape would you get?" (cuboid); "If you stacked two cylinders on top of one another, what shape would you get?" (cylinder); Add any other questions that you can think of.

🔍 Lesson focus

In this lesson, your pupils sort different 3-D shapes into groups based on the properties of the shapes. They also compare different 3-D shapes, identifying the similarities and the differences between the shapes. Read through the introductory text with your pupils, making sure that they understand all the terminology involved. Use models of 3-D shapes to demonstrate the terms 'face', 'edge' and 'vertex' to your class.

Answers

Exercise 3

1.

Cuboid	Cube	Cylinder	Sphere
Sugar	Die	Mug	Ball
Milk		Candle	
Book		Cake	
Shoe box		Can	
Matchbox			
Soap			

Workbook

3.

Shape	Number of vertices	Number of faces	Number of edges
a) Cuboid	8	6	12
b) Cube	8	6	12
c) Square pyramid	5	5	8
d) Triangular prism	6	5	9
e) Triangular pyramid	4	4	6
f) Cone	1	2	1
g) Cylinder	0	3	2
h) Sphere	0	1	0

4. a) 2; **b)** 2; **c)** 2; **d)** 2; **e)** 2; **f)** All equal to 2;
g) yes for f), no for g) and h); **h)** They have curved surfaces

> **Assessment**
>
> Pupils should be able to identify properties of 3-D shapes. Pupils should be able to sort 3-D shapes according to similarities and differences.

> **Homework activity**
> Pupils to complete questions 3 and 4 on page 57 of the WB.

Lesson 4 *Pupil's Book page 185*

Preparation

You will need to have:
• The answers to the Revision exercise to hand.

Starter activity

Read through and discuss the summary on page 185 of the PB.

Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit. The focus is on ensuring that the pupils are able to recognise and identify 3-D shapes and to say whether they are closed or open shapes. Revision exercise page 185.

Answers

Revision exercise

1. cube; **2.** cylinder or a cuboid; **3.** five; **4.** two; **5.** five; **6.** six; **7.** six; **8.** three; **9.** The faces of a cube are all square. The faces of a cuboid are rectangular.; **10.** A closed shape has a lid or a cover. An open solid shape does not have a lid or a cover.; **11.** Open shapes: soap, candle, die, cake, sugar, book, mug. Closed shapes: shoe box, matchbox.

> **Assessment**
>
> Pupils should be able to identify, name and draw 3-D shapes.
>
> They should know the number of faces, edges and vertices of 3-D shapes.
>
> They should also be able to sort 3-D objects into groups.

> **Extension activity**
> Encourage pupils who are able to do so to build other 3-D shapes, such as pyramids and cylinders.

> **Homework activity**
> Ask pupils to find 3-D shaped objects in their own homes. They should write down what the object is and its related shape.

Unit 31 Symmetry

Objectives

By the end of this unit, each pupil should be able to:

- Identify the symmetry and non-symmetry of objects and shapes
- Find lines of symmetry in everyday objects
- Understand that not all shapes have a line of symmetry.

🔧 Suggested resources

Charts showing a variety of plane shapes, some with one line of symmetry, some with two or more and some with no lines of symmetry; Paper and scissors for experiments.

abc Key word definitions

symmetry: one half of a shape being exactly the same as the other half

✗ Common errors that pupils make

Pupils often think a diagonal in a rectangle is a line of symmetry. Emphasize that only when the two halves about the line are identical, are they symmetric.

✏ Evaluation guide

Pupils to:
1. Identify line(s) of symmetry of plane shapes.
2. Locate lines of symmetry of given objects in their homes.

Lesson 1   *Pupil's Book pages 186*

⚙ Preparation

You will need to have:
- The suggested resources per above.

⮐ Starter activity

Show examples of symmetrical shapes. Have some cut out shapes and fold them in half to demonstrate symmetry. Read through the introductory example in the PB with the class. Ask pupils to suggest some shapes that are symmetrical and some that are not. Allow them to sketch the shapes on the board. Discuss each shape with the class.

🔍 Lesson focus

The focus of the lesson is to ensure that pupils recognise lines of symmetry in shapes. Work through the text and both worked examples with the class. Explain that if a shape can be folded in half, and both halves are the same shape, then the shape is symmetrical. A shape can have more than one way that it can be folded and be symmetrical.

Give each pupil a loose sheet of rectangular paper. Fold the paper in half along the length and show that both halves are identical, therefore it is symmetrical. Unfold the paper and draw a line along the fold. Explain that this is called the line of symmetry, and cuts the shape into two halves that are the same.

Fold the paper again, but along the width and repeat the explanation of symmetry. Unfold the paper and draw in the 2nd line of symmetry. Ask pupils if they can find any other lines of symmetry in the rectangle.

Assessment

Pupils should be able to identify symmetry in shapes, explain what symmetry is and draw lines of symmetry on shapes.

Extension activity

Pupils can complete the Puzzle on page 186.

Lesson 2
Pupil's Book page 187;
Workbook page 58

⚙ Preparation

You will need have:
*   Square pieces of paper, cut in half diagonally to form triangles.

➲ Starter activity

Give each pupil a triangle of paper. Fold the triangle in any way and draw all the lines of symmetry that can be found.

🔍 Lesson focus

This lesson continues to look at symmetry of 2-dimensional shapes. Now the pupils are shown more complex shapes where the lines of symmetry are not always obvious. Some pupils may find it easier to trace each shape onto a separate piece of paper, and then cut out the shape and look for the lines of symmetry by physical inspection. This method is useful but time consuming.

Pupils to complete Exercise 1.
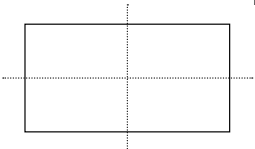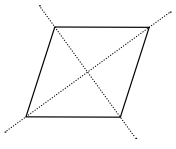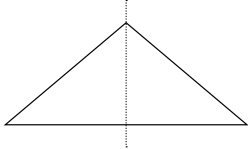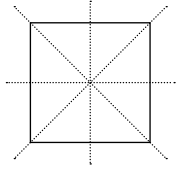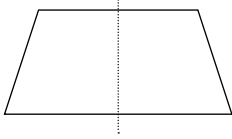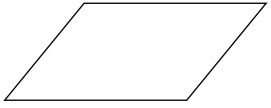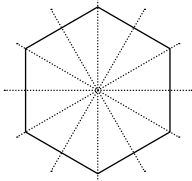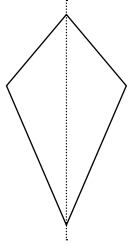
📚 Answers

Exercise 1

1. **a)** 1 line of symmetry; **b)** 3 lines of symmetry;
    c) 3 lines of symmetry; **d)** 2 lines of symmetry;
    e) no lines of symmetry; **f)** 1 line of symmetry
2. **a)** no lines of symmetry; **b)** 1 line of symmetry;
    c) 3 lines of symmetry; **d)** 1 line of symmetry
3. **a)** 1 line of symmetry; **b)** 1 line of symmetry;
    c) no lines of symmetry; **d)** no lines of symmetry

Workbook

1. **a)**   **b)**

2 lines of symmetry   2 lines of symmetry

c)   **d)**

1 line of symmetry   4 lines of symmetry

e)   **f)**

1 line of symmetry   no lines of symmetry

g)   **h)**

6 lines of symmetry   1 line of symmetry

Assessment

Pupils should be able to find lines of symmetry in everyday objects.

Extension activity

Pupils look for a shape in nature with symmetry. Bring the objects to class and identify the lines of symmetry.

Homework activity

Pupils to complete question 1 on page 58 of the WB.

Lesson 3
Pupil's Book page 188;
Workbook page 60

⚙ Preparation

You will need to have:
*   Charts showing a variety of plane shapes, some with one line of symmetry, some with two or more and some with no lines of symmetry
*   Paper and scissors for experiments.

⮕ Starter activity

Allow pupils to fold sheets of paper in half and cut out shapes. The fold in the paper forms the line of symmetry.

Then allow pupils to fold sheets of paper in half and cut out a square, a circle and a rectangle. Ask them to fold the square, circle and rectangle as indicated in the PB on page 186.
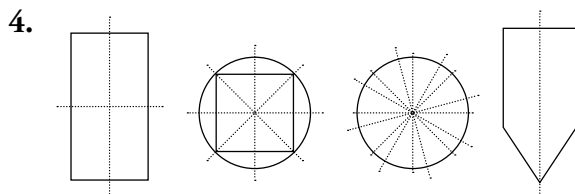
🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 Answers

Revision exercise

1. **a)** 1 line of symmetry; **b)** 1 line of symmetry;
    c) 2 lines of symmetry; **d)** 1 line of symmetry
2. **a)** 1 line of symmetry; **b)** no lines of symmetry;
    c) no lines of symmetry; **d)** 1 line of symmetry;
    e) no lines of symmetry; **f)** 1 line of symmetry;
    g) 6 lines of symmetry; **h)** no lines of symmetry

3.
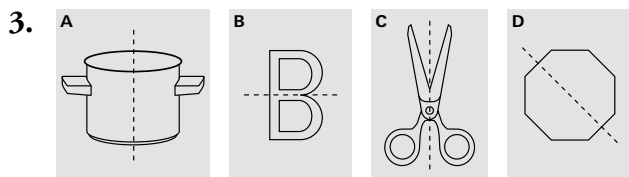
Puzzle

The rectangle has 2 lines of symmetry.
The square has 4 lines if symmetry.
The circle has innumerable lines of symmetry.

Workbook

4.

The circle has infinitely many lines of symmetry, all diameters.

5. a)   b)   c)   d)

Homework activity

Ask learners to find five examples of shapes at home that have one line of symmetry for example, a spoon, a pan, etc.

Get pupils to complete questions 4 and 5 on page 60 of the WB.

Unit 32 Horizontal and vertical lines

Objectives

By the end of this unit, each pupil should be able to:
- Review the properties of plane shapes
- Identify the horizontal and vertical lines
- Identify the primary and secondary cardinal points.

🔧 Suggested resources

Wall charts with examples of plane shapes emphasizing horizontal and vertical lines; Chart and model of the four cardinal points; Accurate drawing of a compass with needle pointing N and S; A map of Nigeria indicating N, S, W and E.

abc Key word definitions

compass: an instrument used to find a direction such as N, S, E or W
horizontal: parallel to the horizon
vertical: at right angles to horizontal
oblique: a line at an angle between horizontal and vertical
isosceles: triangle with two equal sides
polygon: a closed, plane figure with three or more straight sides

✗ Common errors that pupils make

Pupils may be confused about the definition of vertical being straight up on the board and straight up on the page (even though the page itself is horizontal.) Make sure you refer to shapes drawn both on a vertical board and on a flat sheet of paper. Explain that it is easiest to think of vertical as straight up, whether this is in the air or on the table.

Pupils may confuse the relative positions of East and West. Use some form of memory exercise such as the body shapes or a mnemonic such as that given in the lesson focus, to help them to remember, and give lots of practice. Make sure that all pupils are fully sure about which is their right or left, or the practical exercises may cause more confusion. Pupils may sometimes write ES rather than SE for the mid-positions. Remind pupils that these directions always start with North or South. For example, North East or South West.

✏️ Evaluation guide

Pupils to:
1. Locate the horizontal and vertical lines on given objects.
2. Mention five objects or materials that have horizontal and vertical lines in their environment.
3. Locate given cardinal points on the chart and model.
4. Mention the location of two given capitals of states in Nigeria.

Lesson 1 *Pupil's Book pages 189–190; Workbook pages 59–60*

⚙️ Preparation

You will need to have:
- Wall charts with examples of plane shapes emphasizing horizontal and vertical lines.

➡️ Starter activity

Discuss the properties of plane shapes as shown on page 189 of the PB.

🔍 Lesson focus

Draw a rectangle on the board, and ask pupils to tell you all the things they know about the rectangle. Tell them that they are going to list some instructions to tell somebody, who doesn't know what a rectangle is, how to draw one. Ask them to

think about the words they need to use to describe the direction they need to draw the lines, and how long they should be. Guide them to make precise instructions, using correct vocabulary. For example it is not enough to say "draw four lines", without also saying how the lines relate to each other. They may refer to right angles, or they may talk about across and up. Encourage them to explore the different ways to say the same thing.

Now show them a shape made up of horizontal and vertical lines such as a desk. Ask pupils to give you instructions to tell you how to copy the shape. They need to remember to tell you where to start and in which direction to go (up/down or right/left). Repeat with different shapes to reinforce the idea.
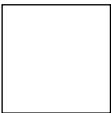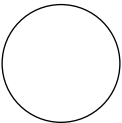
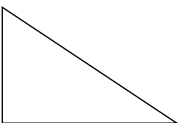Pupils then complete Exercise 1.

🔖 Answers

Exercise 1

1. **a)** squares and equilateral triangles;
   b) equilateral; **c)** two; **d)** one; **e)** unlimited;
   f) rectangles and parallelograms; **g)** kites and isosceles triangles; **h)** rectangles and rhombus;
   i) four; **j)** trapezium and parallelogram

Challenge

1. Equilateral triangle; **2.** Square; **3.** Trapezium

Workbook

2. **a)** regular octagon; **b)** equilateral triangle;
   c) regular pentagon
3. **a)** both pairs of opposite sides equal and parallel, both pairs of opposite angles equal;
   b) all sides equal in rhombus; **c)** 2 sides and 2 angles equal; **d)** not all sides equal; **e)** all sides equal; **f)** no right angles

6. **a)**   **b)**

   c)   **d)**   **e)**

Assessment
Pupils should be able to state the properties of plane shapes.

Extension activity
Pupils can complete the **Challenge** on page 190.

Homework activity
Pupils to complete questions 2, 3 and 6 on pages 59 and 60 of the WB.

Lesson 2   *Pupil's Book pages 190–191; Workbook page 61*

⚙ Preparation
You will need to have:
*   Wall charts with examples of plane shapes emphasizing horizontal and vertical lines
*   The rectangle drawn from Lesson 1.

➡ Starter activity
Ask pupils to each draw a rough sketch of a landscape (two minutes maximum time). Choose a few that show the horizon. Discuss the term 'horizon' with the class.

Ask pupils to point to vertical lines in the classroom for example, edges of doors and windows and the chalk board; corners where walls join; chair and table legs. Next, ask them to point to horizontal lines for example, table and desk tops, tops of doors and windows and so on.

🔍 Lesson focus
In this lesson your pupils will learn to recognise horizontal and vertical lines in 2-D shapes. Refer back to the starting activity from Lesson 1 and explain that there is a word that describes all the lines that go across from left to right – it is horizontal. Ask pupils to show you all the horizontal lines in the shape you have drawn. Then repeat to define vertical. Ask them to draw a rectangle on a piece of paper, and compare it to the one on the board. Explain that we still define the

upright sides of the rectangle as being vertical, even though they are flat on the desk.

Read through the example on pages 190–191 and then pupils can complete Exercise 2.
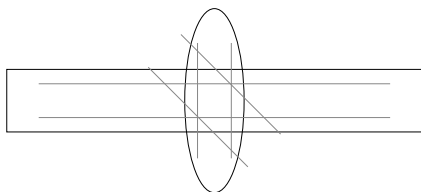
📚 Answers

Exercise 2

1. **a)** H; **b)** V; **c)** O; **d)** O; **e)** H and V; **f)** H and V;
    g) H and V
2. **a)** V; **b)** V and H; **c)** neither; **d)** H; **e)** H

Workbook

1.

2. **a)** 2 horizontal and 2 vertical; **b)** 0 Horizontal and 2 vertical; **c)** 2 horizontal and 2 vertical; **d)** 2 Horizontal and 3 vertical

---

Assessment

Pupils should be able to identify horizontal and vertical lines.

Extension activity

Ask pupils to identify two horizontal and two vertical lines in the classroom. The lines can be part of the room or objects in the room.

Homework activity

Pupils to complete questions 1 and 2 on page 61 of the WB.

Lesson 3   *Pupil's Book pages 192–193; Workbook page 61–62*

⚙️ Preparation

You will need to have:
*   Chart and model of the four cardinal points
*   Accurate drawing of a compass with needle pointing N and S
*   A map of Nigeria indicating N, S, W and E.

➲ Starter activity

Ask pupils to describe their walk to school, using words such as straight on, turn right and turn left. Use one pupil's route and represent this on the board, starting at a point on the left of the board, and representing left and right turns as a series of right angles. Ask a pupil to come to the front of the class and describe some simple instructions: Go forward, turn left, go forward, turn right, go forward, turn right, go forward, turn left, go forward, stop. As the pupil follows the instructions, draw the path he takes on the floor, to show the right-angled turns. Copy the path onto the board. Ask the pupils to make up a list of instructions, and together track the path on the board. Remind them they need to know where they are starting and finishing.

🔍 Lesson focus

Show the pupils a map, or draw a simple map on the board (with North/South marked vertically) and explain that when reading maps it is important to know which direction is North, or which is South, in order to describe how to go from one place to another. Point to two places on the map (choose one which is due north of another), and explain that if you wanted to travel from place A to place B you would need to know which direction to go. Point out the arrow on the map which labels North. Explain that if we know which direction is North, then we can work out all other directions from this. Show them a compass (or refer to the introductory text) and point out that there are four main cardinal points called North, South, East and West, but the pointer always points to North. These directions are all at right-angles to each other. The order of these points is important. Pupils should know that South is opposite to North, and East is opposite West. The introductory text explains a way to use your body to remember which is which, and you can ask them to stand up and demonstrate this. (Be careful to all face the same way – if you face the pupils and raise your right arm, it is the mirror image of their left arms!)

Another useful way to remember which direction is which is to use the mnemonic, reading clockwise around the compass: Naughty Elephants Squirt Water. Draw (or put down a large picture of) a

compass on the floor, and ask someone to stand at the centre, facing North. Ask him/her to turn right (through a right angle) and ask the class to tell you which direction they are now facing. Use lots of examples to practise, starting facing one way and turning left and right, to find the new direction.
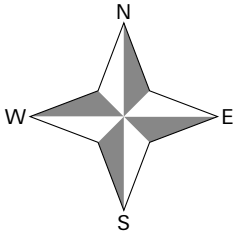
Ask pupils to complete Exercise 3.

📖 Answers

Exercise 3

1. **a)** North
   b) South West
   c) south
   d) North West
   e) North East

Workbook

3.

4. **a)** West; **b)** East; **c)** South
5. **a)** North; **b)** South; **c)** West
6. **a)** East; **b)** North; **c)** one right angle to the right

Assessment

Pupils should be able to identify and name the primary and secondary cardinal points.

Extension activity

Make a compass. You will need a pin or needle, a magnet, a piece of cork and a glass of water. Hold the pin or needle in one hand and run the magnet along it, always in the same direction, 80-100 times. Stick the pin or needle through the piece of cork so that it is balanced. Float the cork in the glass of water and allow it to settle. Test the compass by moving the cork – observe how it returns to the original position.

Homework activity

Pupils to complete questions 3–6 on pages 61 and 62 of the WB.

Lesson 4 *Pupil's Book page 194; Workbook page 62*

⚙️ Preparation

You will need to have:
• The answers to the Revision exercise to hand.

🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.

📖 Answers

Revision exercise

1. **a)** four; **b)** four; **c)** triangle; **d)** oblique line;
   e) West; **f)** South West
2. **a)** Yankari National Park is East of Jos.;
   b) Lagos is South of Ibadan; **c)** Kano is North East of Kamuka Wildlife Reserve; **d)** Kamuka Wildlife Reserve is South West of Kano;
   e) Benin is South of Pategi; **f)** Baga is East of Nguru)

Workbook

7–8. Pupils' own answers.

Assessment

Evaluation of this unit gauges the extent to which individual pupils have achieved the objectives stated at the beginning of this unit. You should give pupils a set time in which to complete the assessment. Most pupils should be able to achieve their maximum score in about 40 minutes. Pupils should work through the questions individually. Encourage them not to spend too much time on any one question if they are stuck. Instead, they should go on to the next question, and come back to the question they were struggling with if they have time at the end of the assessment.

Homework activity

Pupils to complete questions 7 and 8 on page 62 of the WB.

Objectives

By the end of this unit, each pupil should be able to:
* Review work done in pictographs
* Draw and read a bar graph.

🔧 Suggested resources

Charts showing examples of tally charts, pictograms and bar graphs; Examples of easy graphs and tables from the media; Unifix cubes or any other stackable cubes or blocks; Enlarged pictogram; Cardboard pieces in different colours; Cardboard showing horizontal and vertical bar graphs.

abc Key word definitions

represent: show in a certain way
mode: the most commonly occurring value
pictogram: table using pictures to represent information
tally: count
graph: a drawing showing the relation between pieces of information
bar graph: where bars of different lengths show the information

💬 Frequently asked questions

Q What prior knowledge do the pupils need?
A Pupils should:
* have learnt about and mastered pictograms and the one-to-one correspondence between data given and the pictures in Primary 3
* be able to collect simple data and display the data in a pictogram.
Q What is the difference between bar graphs and pictograms?
A In pictograms, data is represented using pictures or diagrams. In bar graphs, data is represented using bars or columns.

✏️ Evaluation guide

Pupils to:
1. Construct horizontal and vertical bar graphs of given data.
2. Solve problems from their environment where data can be represented using bar graphs.
3. Identify a bar graph.
4. Determine the mode of a bar graph generated from their environment.

Lesson 1	*Pupil's Book page 195; Workbook page 63*

⚙️ Preparation

You will need to have:
* Charts showing examples of tally charts, pictograms and bar graphs.

➲ Starter activity

Introduce this topic by explaining to the class why it is important to be able to collect and display data. If possible, show them examples of easy graphs and tables from the media. Ask them easy questions about why data is used in the world around us. For example, you may ask them questions like: "What is this graph/table about? Why do you think this information was used in this way?" Encourage your pupils to ask questions about the graphs and data. It is important that you allow them time to engage with the questions and give them time to think about the answers.

🔍 Lesson focus

In this unit the pupils are introduced to new concepts relating to data handling in a carefully graduated way. It is important that you work through the exercises in the order that they are presented in the PB.

Throughout this unit, you continually ask your pupils to engage with the information in the

diagrams and text. This is a very important aspect of representing data on graphs. Make sure that you allow them ample time to engage with the questions and to consider their answers. The exercises are structured in such a way that your pupils can engage with the new knowledge that they are acquiring.

In Lesson 1, your pupils interpret and record data in pictograms. In Lesson 2, your pupils work with different representations of data in bar graphs.

The focus of this lesson is on interpreting, ordering and organising data. Read through the introductory text with your class and explain the definitions in the Key words feature. Read through Exercise 1 with your class. This exercise is about reading information from a pictogram and interpreting this information. Remind pupils about the concept of a tally sheet. Explain that tallies allow us to count items by grouping the counts into bunches of five. Show them the charts on the wall.
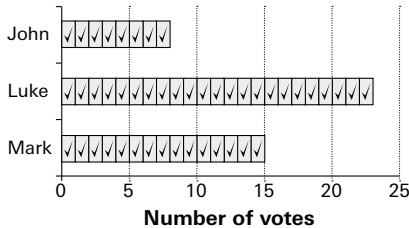
📚 Answers

Exercise 1
1. **a)** 250 cars; **b)** 2012; **c)** 130 cars;
d) 40 more cars; **e)** 2011

Workbook
2. **a)**   **b)** 46

Assessment

Pupils should be able to represent information in a pictogram. Pupils should be able to read information from a pictogram.

Extension activity

Ask children to collect data on how many children in their class like sport. How many like tennis, cricket, rugby, netball, hockey and soccer. Ask them to draw a pictogram of the data.

Homework activity

Pupils to complete question 2 on page 63 of the WB.

Lesson 2   *Pupil's Book pages 196–197;*
                        Workbook page 63

⚙️ Preparation

You will need to have:
- The suggested resources.

➡️ Starter activity

Draw the table from the homework exercise in the previous lesson on the board. Explain to your class that, together, you are going to make a bar graph that represents the data in the table. Ask pupils to form a tally table on the board. Ask one of the pupils to demonstrate how he could use the data to draw a bar graph consisting of six columns and ten rows, alongside the table.

Under the columns, write the names of the sports in the table, one sport per column. Number the rows from 0 to 10, by writing the numbers to the left of each row: 0 should be alongside the bottom line and 10 should be alongside the top line. Ask for a different volunteer for each column. The volunteers should shade the columns to correspond to the number of pupils who voted for each sport. Make sure that they shade the correct number of blocks each time, working from the bottom row upwards. Once the bar graph is complete, discuss the table and the graph with your class. Do they all see the correspondence between the two representations? How do the two representations differ?

🔍 Lesson focus

Read through the introductory text with your class and work through the example on page 196 of the PB with them. Use the bar graph to explain that the mode is the item with the tallest bar or with the highest frequency. Reading through the table used in the starter activity, explain how the data has been used to draw the bar graph. Guide them to see the differences between pictograms and bar graphs.
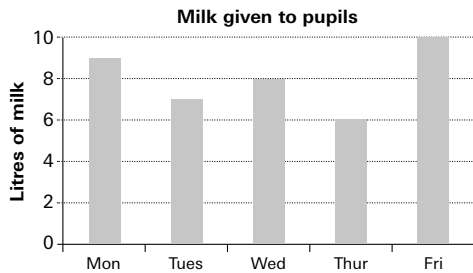
Pupils must complete Exercise 2.

Answers

Exercise 2

1. **a)** 30 pupils in the class; **b)** the cat; **c)** the dog; **d)** eight; **e)** hamsters; **f)** gold fish

2. **a)**

Milk given to pupils

b) Thursday; **c)** Friday; **d)** 10; **e)** 16 ℓ; **f)** 40 ℓ

Workbook

1. **a)** Languages; **b)** Physical Education; **c)** 105

Assessment

Pupils should be able to represent information in a bar graph. Pupils should be able to read information from a bar graph.

Extension activity

Pupils find examples of other ways of representing data from media sources such as newspapers, magazines and the internet. Pupils must find out the name of the graph, for example, pie chart, line graph or bar graph.

Homework activity

Pupils to complete question 1 on page 63 of the WB.

Lesson 3   *Pupil's Book page 198; Workbook page 64*

⚙ Preparation

You will need to have:
• The answers to the Revision exercise to hand.

🔍 Lesson focus

Pupils revise the concepts covered in this unit by working through the Revision exercise. Read through and discuss the Summary in the PB before they do the Revision exercise.

Check pupils' progress and monitor carefully how they cope with integrating the content covered in this unit.
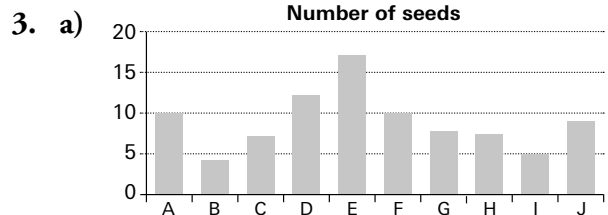
Answers

Revision exercise

Favourite colours of Class 4 Prince
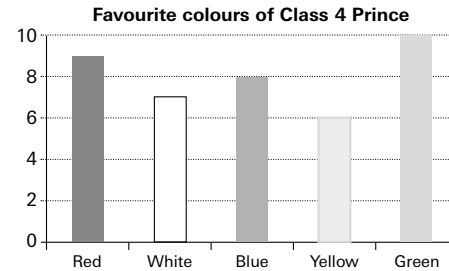
1. **a)** blue; **b)** white; **c)** red; **d)** green; **e)** 10; **f)** 3; **g)** 1; **h)** 37

Workbook

3. **a)**

Number of seeds

   b) 5   **c)** 1   **d)** 89   **e)** 7 and 10
4. **a)** July, August and September
   b) December, January and February
   c) 1 175 mm

Assessment

Pupils should be able to interpret data in a table and a tally chart.

They should be able to write numbers in the form of tallies and keep accurate records of data.

They also need to be able to draw a pictogram and a bar graph and find mode from a bar graph.

Homework activity

Pupils to complete questions 3 and 4 on page 64 of the WB.

Pupil's Book page 199

Objectives

This project requires the pupils to interview class mates in order to collect data. It gives pupils the opportunity to put what they have learnt about data collection into practice, and shows some applications of mathematics in real-life.

🔍 Guidelines

Complete this project in class over two lessons.

In Lessons 1, pupils will complete questions 1 and 2. Pupils should start off by deciding what topic they would like to use. Read over the suggestions A, B, C and D in the PB with the class. They might choose a topic from the book, or they might suggest a different topic, for example favourite animal, car or TV program. Allow ten minutes for discussion.

Once pupils have chosen their topics ask them to draw up a tally table to collect their data. Draw an example of a tally table on the board to assist pupils. Remind them that they need to have responses from at least 30 people, and they need to record the data on their tally tables, using tally marks. If there are less than 30 people in the class, arrange with another class to survey. Pupils may have more than 30 responses.

In Lesson 2, pupils will complete questions 3-5. Allow pupils to work on their own or in small groups to answer the questions. Check that pupils draw up the pictogram table correctly, using suitable icons, and remind them to count their tallies carefully. Encourage pupils to work neatly with a ruler to draw their bar graphs and ask them to colour each bar a different colour.

📖 Answers

1.–5.   Pupils' own answers.

Assessment

Because the pupils' findings will be different, assess pupils on the following criteria:
* Collecting data
* Identifying the mode of the data
* Representing the data on a pictogram
* Representing the data on a vertical bar graph.

Pupil's Book page 201

Objectives

This assessment is a summative assessment of work covered in Units 23 to 33.

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 learner 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. Complete the Assessment over two lessons: questions 1–7 in Lesson 1 and questions 8–15 in Lesson 2.

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 them.

📖 Answers

1. **a)** 10 kg; 7.5 kg; 187.5 kg; 13.750 kg;
    b) 17.5 kg; **c)** 218.75 kg; **d)** No they cannot all be packed on the shelf.; **e)** He will need 3 shelves.
2. **a)** ₦2 713.68 – ₦2 094.05 = ₦619.63
    b) 100 × 776.25 + 150 × 210.60 + 125 × 792 + 55 × 315.20 = ₦225 551
    c) 72 × 1 034.29 + 104 × 269.55 + 119 × 989.55 + 23 × 420.29 = ₦229 925.20
    d) 72 × 776.25 + 104 × 210.60 + 119 × 792 + 23 × 315.20 = ₦179 290
    229 925.20 – 179 290 = ₦50 635.20 profit – Yes.
3. **a)** Five past two; **b)** Twenty-five past one; **c)** Five to five; **d)** Quarter to two in the afternoon; **e)** Quarter past six in the evening; **f)** Five past eight in the morning

4. **a)** D; **b)** C; **c)** A; **d)** E; **e)** F; **f)** B
5. **a)** A: 12 cm²; B: 5 cm²; C: 9 cm²; D: 12 cm²
    b) A: 4 × 3; B: 5 × 1; C: 3 × 3; D: 5 × 2; 1 × 2
    c) A: 48 cm²; B: 20 cm²; C: 36 cm²; D: 48 cm²
6. **a)** 15 km²
7. **a)** 150 000 m²; **b)** 15 ha
8. **a)** 10.5 ℓ; **b)** 4.5 ℓ; **c)** 15 ℓ
9. **a)** 0.4 ℓ; **b)** 6.8 ℓ; **c)** 1.2 ℓ
10. **a)** A, E; **b)** B, D, F; **c)** C, G
11. All four sides are equal length.
12. **a)** none; **b)** A, E; **c)** C, G
13. **a)** vertical, horizontal; **b)** north east
14. **a)**
15. **a)** 19 + 12 + 7 + 25 = 63 tins
    b) Condensed milk
    c) Canned fish

Assessment

On completion of the assessment, look for correct answers and mistakes made by individuals. You 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, you can identify weaknesses in individuals and provide the necessary support, and also strengths of individuals and provide them with more challenging activities.

You are also able to identify any weaknesses in the teaching programme and make adjustments as necessary.

Pupil's Book page 205

Objectives

This practice examination is a summative assessment of work covered throughout the year.

It is important that it is completed by individuals and not with the support of other pupils as this would not uncover any difficulties a learner may be having with particular concepts.

Encourage pupils to not spend too much time on one problem. They should rather move onto the next problem and return to the difficult ones if they have time at the end of the examination.

🔍 Guidelines

Simulate examination conditions: tell the pupils that they have to work on their own and may not discuss questions or answers with other pupils; ensure quiet In the classroom while pupils work; write the start and end time of the examination on the board, with 10 minute intervals – cross out the time interval as the session progresses to help pupils keep track on time.

Complete the practice examination over two class sessions. Complete questions 1–10 in Session 1 and then questions 11–20 in Session 2.

Have pupils write their answers and workings out on loose sheets of paper so that you can take them in for marking.

📚 Answers

1. **a)** 101 992, 101 987, 101 982, 101 977, 101 072; **b)** 59, 66, 73, 80, 87; **c)** 337, 397, 457, 517, 577
2. **a)** LVI; **b)** XXVIII; **c)** LXXIX
3. **a)** 36; **b)** 99; **c)** 41
4. **a)** 823 < 832; **b)** 569 > 470; **c)** 0.45 < 0.54; **d)** 1.25 > 0.75; **e)** $\frac{4}{5} < \frac{9}{10}$ **f)** $\frac{7}{5} < 1\frac{3}{7}$
5. **a)** 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70; **b)** 28
6. **a)** 8; **b)** 7; **c)** 6
7. **a)** $\frac{11}{3}$; **b)** $\frac{50}{9}$; **c)** $\frac{12}{5}$; **d)** $\frac{799}{100}$
8. **a)** $\frac{72}{100}$; **b)** $\frac{12}{100}$; **c)** $4\frac{70}{100}$; **d)** $7\frac{99}{100}$

9. **a)** 0.85, 0.81, 0.80, 0.79, 0.08; **b)** $\frac{28}{6}$, $3\frac{5}{7}$, $2\frac{4}{5}$, $\frac{1}{2}$
10. **a)** 8 045; **b)** 3 919; **c)** 4 619; **d)** $\frac{11}{20}$; **e)** $3\frac{2}{3}$; **f)** 11.17; **g)** 3.33; **h)** 836; **i)** 86; **j)** 46
11. **a)** 75; **b)** 62; **c)** 180; **d)** 720; **e)** 40.75; **f)** 42
12. **a)** 2.85 m; **b)** 17.1 m; **c)** ₦11 400; **d)** ₦1 660
13. **a)** 12 m; **b)** 16 m; **c)** 56 m;
14. **a)** 5 km (or 5.5 km); **b)** 5.2 km; **c)** 26 km
15. **a)** Tele; **b)** 5 hrs 15 min
16. **a)** 5 June 2016; **b)** Tuesday 28 June; **c)** 11:30 am
17. **a)** 102 km²; **b)** 10 200 ha
18. **a)** 1 650 ℓ; **b)** 12 150 ℓ
19. **a)** All four sides of a square are equal in length
    b) Squares have four sides, squares have four angles, squares have four right angles, all sides of a square are equal in length (any two of these)
20. South

Assessment

On completion of the practice exam, look for correct answers and mistakes made by pupils. You 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 examination, you can identify weaknesses in individual pupils and provide the necessary support and revision needed in preparation for the final examination.