

Grade

4

Intermediate Phase Teacher's Guide

Mathematics



**WESTERN CAPE
Education Department**

Provincial Government of the Western Cape



INTRODUCTION TO THE TEACHER'S GUIDE

Accompanying the work schedule is this teacher's guide, which gives more detail on the work schedule. The following information will be found in this teacher's guide:

1. Core concept/s
2. Resources
3. Integration
4. Ideas of Methodology with Activities and Examples
5. Consolidation of Concepts
6. Homework/Reflection on Learning
7. Extended Activities
8. Assessment
9. Approved Software List for Mathematics

Results from the WCED Grade 6 Diagnostic Tests show that the mathematical competencies of the learners in a class vary greatly. (In some instances from Grade 1 competency to Grade 6 competency.) This requires differentiated teaching in the majority of the mathematics' classes. It is with this in mind that the WCED recommends that when starting a new concept the teacher first starts with the concrete, i.e. the actual concrete representation, then moves to the semi-abstract, i.e. diagrammatic representation, and then to the abstract, which is the use of numbers and symbols only. This method has been expounded under the heading 'Ideas of Methodology with Activities and Examples' in the teacher's guide.

A daily 10-minute mental mathematics time has been allocated. It is recommended that the mental mathematics flipbooks be used during this time. Teachers should supplement this with regular repetition of number combinations and times tables.

It is during the Intermediate Phase that the foundations for algebra and geometry are laid (i.e. LO 2, 3 and 4). Learners must experience the concepts in these learning outcomes through a practical and investigative approach, e.g. learners must spend time investigating the dimensions and common characteristics of shapes and objects, so that their properties can be formulated. The same is required for measurement. Learners must discover the formula for area etc. through investigation. It is only in the Senior Phase that they will be expected to use the formula.

Built into the work schedule and teacher's guide is time for consolidation of the concepts. Learners must be given enough time in class to practise the concepts. Homework must be given daily so that these concepts practised in class can be consolidated. Learners will not be able to consolidate mathematical concepts without doing homework.

Ideas for formal assessment have been given. Exemplar assessment tasks which could be used with this work schedule will be distributed to schools in January 2009. This should further assist in the standardisation of assessment in the WCED.

The WCED hopes that these work schedules and teacher's guides will assist in reducing the load on teachers with regard to planning. Time can now be spent on the actual planning of the lesson.

MATHEMATICS GRADE 4 TEACHER'S GUIDE

DAILY ROUTINE

At least one hour must be spent on Mathematics every day

TIME ALLOCATION

10 min	Oral and written Mental work
10 min	Review and Correct homework of previous day
20 min	Teacher introduces the concept of the day
15 min	Problem solving – Application and Reflection of the day's work
5 min	Homework tasks are given and explained by the teacher

REVISION OR BASELINE ASSESSMENT (refer to work schedule)

Formal written activity must be completed individually by learners and assessed by teachers. All baseline assessment must be kept as part of learners' portfolios. Problem areas must be identified and strengthened before continuing.

MENTAL MATHEMATICS must be done during the first 10 minutes of every period covering those Assessment Standards already covered. Possible activities from mental mathematics flipbook are given in work schedule for every week.

MENTAL MATHS STRATEGIES

1. **COUNTS FORWARDS AND BACKWARDS** - Counts forwards and backwards in steps from a certain number.
2. **REARRANGE** – Numbers change places e.g. $9 + 27 = 27 + 9$
3. **RENAME: MULTIPLES OF 10 AND 100** – Breaking down of numbers in 100's, 10's, 1's.
e.g. $236 + 45 = 230 + 40 = 270 + 10 + 1 = 281$
4. **RENAME: BRIDGING USING MULTIPLES OF 10** - Breaking down numbers and rounding to the nearest multiple of 10.
e.g. 47 becomes $50 - 3$, $27 + 5 = 30 + 2$, $18 + 9 = 20 + 7$
5. **RENAME: COMPENSATING** - Helps with + and – of numbers closer to multiples of 10. The number that gets added, is rounded off to the nearest 10, where after the difference is +/-
e.g. $27 + 18 = 25 + 20$, $27 - 18 = 27 - 20 - 2$
6. **RENAME: USING ALMOST DOUBLES** - When learner is comfortable using doubles, they can use this information when calculating close numbers:
e.g. $8 + 7 = 8 + 8 - 1 = 15$, $9 + 13 = 9 + 9 + 4 = 22$
7. **RENAME: BRIDGING BY USING OTHER NUMBERS THAN 10**
Bridging numbers other than 10.
e.g. Time: learner learns that bridging with 10 and 100 is not always the correct strategy
e.g. $09:59 + 2 \text{ min}$, is read as $10:01$ and not $09:61$
8. **MULTIPLICATION TABLES TO 10** – Repeated addition and subtraction of numbers in counting patterns.

9. **MULTIPLES OF 10** - X10: add a 0, X 100 add 00. Establishing place value focusing on powers of 10.
e.g. $7 \times 10 = 70$, $67 \times 100 = 6\ 700$
10. **DOUBLING AND HALVING** - Doubling and halving of numbers (even and uneven).
e.g. $7 + 7 = \text{doubling } 7$, $14 \times 5 = 14 \times 10 \div 2$
11. **X AND \div SINGLE DIGIT NUMBERS ; X AND \div 2 DIGIT NUMBERS** - Breaking down numbers to primitive ways to solve.
e.g. $9 \times 8 = 9 \times (3 + 5) = 9 \times 3 + 9 \times 5$
12. **FRACTIONS: DECIMALS AND PERCENTAGES** - Relation between fractions, percentages and decimal fractions. All are the same, represents same fraction
e.g. $\frac{1}{2} = 50\% = 0,5$

PROBLEM SOLVING AND APPLICATIONS

The strategies stated in 4.1.10 and 4.1.11 must be practised daily whilst teaching LO1 and LO4 mainly.

- 4.1.10. Techniques to perform written and mental calculations with whole numbers in the above number range:
 - building up and breaking down numbers; (e.g. expanded notation)
 - rounding off and compensating
 - doubling and halving
 - using a number line
 - using a calculator.
- 4.1.11. Use a range of strategies to check solutions and judges the reasonableness of solutions.

TERM 1

WEEK 1

MATHEMATICAL VOCABULARY

Baseline assessment

CORE CONCEPT

Revision – Whole numbers and basic operations

RESOURCES

Illustrative examples

INTEGRATION

Teacher lead integration

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

Refer to Illustrative Examples of grade 3 for revision or baseline assessment.
(AS 3.1.3; 3.1.5; 3.1.8; 3.1.10)

CONSOLIDATION/HOMEWORK/REFLECTION ON LEARNING:

To be planned and mediated by teacher

EXTENDED ACTIVITY

Teacher lead activity

ASSESSMENT

Revision/ Baseline assessment

WEEK 2

MATHEMATICAL VOCABULARY

Operation keys
Clear key
Cancel key
Constant facility
Number system

CORE CONCEPT

Calculator
History of counting in different cultures

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Calculator
Posters

INTEGRATION

Technology, NS, EMS

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

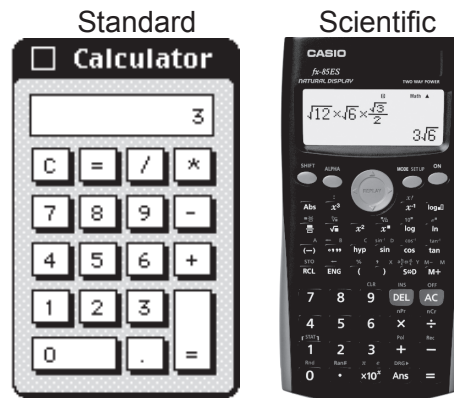
LO and ASs

Use of the calculator (4.1.10)

Activities

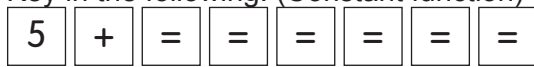
- Give each learner a picture of a calculator. Let them colour in the different digits. Now discuss the different functions of the different keys as set out below:

Different types of calculators:



- Using your calculator
Experiment and learn how to use the following:
 - On/of switch
 - Clear/cancel function
 - Operation keys (+, -, x, ÷)
 - Constant facility
 - Decimal point.
- Use a calculator to add the following: (Constant facility)
 $467 + 467 + 467 + 467 + 467 + 467 + 467 = ?$
 How did you do this?
 Did you add all the numbers?
 How many times did you add the number?
 Can you think of a shorter method?

- Key in the following: (Constant function)



What do you notice?
 How many times did you press ?
 What is the answer to 5×6 ?
 Can you do this with bigger numbers?

- Learners work in pairs. Give each learner a worksheet with basic mental calculations (or write on the board). One learner does calculations with a calculator and the other with pen and paper. Let learners do the calculations and write down the answer. Compete against each other to see who can finish first.
 Discuss possible reasons for who finishes first. Maybe learner worked too fast and made too many mistakes. The learner without the calculator does not know his/her tables, etc.

LO and ASs

History of counting in different cultures (4.1.2)

Discuss ways of counting in the past, e.g. notches in sticks, counting stones, scratches on cave walls, knots in rope, etc.

Activities

- Ancient Egyptian numeral system (units = I ; 10 = \cap up to 100)
 The ancient Egyptians represented: one with this symbol: | 10 with this symbol: \cap

What is the total value of the number represented here?



Convert from Egyptian number system to our number system and vice versa.

Roman numeral system (1 = I, 5 = V, 10 = X, 50 = L, 100 = C up to 100)
The ancient Romans wrote one like this: I and five like this: V

What numbers do these symbols represent?

- III
- VI
- VIII
- IV

Explain, in your own words, how the Roman system works.

Convert from Roman number system to our number system and vice versa.

CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem- solving.

EXTENDED ACTIVITY

Calculator on cell phones

Give sums to learners that will give words on the calculator as answers.

Calculator Fun! A Backchat – Calculators can make words as well as numbers. Turn it upside-down to read these!

- | | | |
|-----------------------|-----------------------|-------------------------|
| 1. $31 \times 7 =$ | 2. $3859 \times 2 =$ | 3. $1929 \times 4 =$ |
| 4. $179 \times 3 =$ | 5. $1911 \times 3 =$ | 6. $49612 + 5766 =$ |
| 7. $3651 + 1986 =$ | 8. $29611 + 8207 =$ | 9. $0.0123 + 0.0668 =$ |
| 10. $5632 + 2082 =$ | 11. $66666 + 10679 =$ | 12. $0.8968 - 0.1234 =$ |
| 13. $6311 + 1427 =$ | 14. $0.18 + 0.19 =$ | 15. $155699 + 223107 =$ |
| 16. $47681 - 12345 =$ | 17. $169 \times 2 =$ | 18. $0.45 - 0.43 =$ |
| 19. $103 \times 6 =$ | 20. $1377 \times 4 =$ | |

ASSESSMENT

Informal: Observe learners' ability to work with concepts. Make notes, identify problem areas and re-teach / revise if necessary.

WEEK 3

CORE CONCEPT

Whole numbers

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Number board

MATHEMATICAL VOCABULARY

Whole number
Numeric value
Place value
Interval
Even number
Odd number
Multiple

Flard cards
 Base 10 blocks
 Mental Maths flipbooks
 Concrete material e.g. counters; number lines; hundred chart

INTEGRATION

Technology, Language

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

 **LO and ASs**

Recognise, represent, describe and compare numbers (4.1.3)
 Start with two digit numbers and build up to at least 4-digit numbers
 Read, say and write up to at least 4-digit numbers
 (Possible introductory activity: Mental Maths Flipbooks – Activity 6, 8)
 Convert from words to numbers and numbers to words

 **Activities**

- Read numbers to learners and they should write it in words e.g. 16 = sixteen
- Shade in the number five thousand seven hundred and forty-nine in the grid below:

5 974	4 579	4 957
7 459	7 495	5 749
4 759	5 479	4 975
7 954	5 947	7 945

- Read, say and write down the following numbers:
 (Learners can write numbers with fingers in the air while they are reading / saying the words.)
 - Twenty-nine
 - Eight hundred and forty-three
 - Nine thousand and twenty-two
 - Read these: 785, 1179, 4601, 3002, 8075...
 - Find the card with: 'two thousand, three hundred and sixty' on it; 'five thousand and seven' on it; 'six thousand and seventy-six' on it.
 - What number needs to go in each box? Explain why.
 - $3642 = \square + 600 + 40 + 2$
 - $5967 = 5000 + \square + 60 + 7$
 - $4529 = 4000 + 500 + \square + 9$
 - $1398 = 1000 + 300 + 90 + \square$
 - Write the number that is equivalent to:
 - seven thousands, four hundreds, five tens and six ones (units)
 - two thousands, nine hundreds and two ones (units)
 - five thousands, four hundreds
 - Write in symbols / digits:
 - four thousand, one hundred and sixty-seven... → 4 167
 - six thousand, four hundred and nine... → 6 409
 - ten thousand, three hundred and fifty... → 10 350
 - Write in words: 7001, 5090, 8300...
- Arrange the numbers below from the smallest to the biggest:
 111; 1 101; 1 110; 1 011
- Make the biggest/smallest number you can with these digits: 3, 2, 5, 4, 0. Write your number in words.

LO and ASs

Recognise, represent, describe and compare numbers odd and even numbers to at least 1 000

Activities

- Explore practically by working with numbers to be able to describe the pattern e.g. all odd numbers end in 1, 3, 5, 7 or 9 therefore 201, 203, 205, 207, 209 are all odd numbers) (Possible introductory activity : Mental Maths Flipbooks – Activity 25).

- Possible teaching method:
 - Divide class into groups of 4 to 6
 - Give each group a piece of paper
 - Draw the following on the board

Group A				Group B			
114		16	24	3	159		11
	4		30		7		25
184		168	174		33		91
	140	8		157		163	189

- Ask the groups to look at the numbers and determine the differences and similarities between the two sets of numbers.
- The groups must record the differences and similarities on their piece of paper, e.g.

Similarities	Differences
All the numbers are between 0 and 200 Whole numbers	Group A are even numbers and Group B are uneven numbers All numbers in Group A end in 2, 4, 6, 8 or 0 All numbers in Group B end in 1, 3, 5, 7 or 9

- Have a class discussion about the learners' findings.
 - What is the difference between odd and even numbers?
 - How are odd and even numbers the same?
 - How will you determine whether 45 874 is odd or even?
 - Can you find another way to determine whether 45 874 is odd or even? Explain.
- Let learners discuss the following in their groups.
 - Odd number + Odd number = Even or Odd number
 - Even number + Even number = Even or Odd number
 - Odd number + Even number = Even or Odd number

- Can you complete these number patterns?
30; 32; 34; ___; ___; ___; ___
561; 563; 565; ___; ___; ___; ___
- Ashraf counts aloud like this: 1; 3; 5; 7; ... right up to 1 000.
What do we call this range of numbers?
Will he say the number 87 as well? Why?
Will he say the number 365 as well? Why?
Will he say the number 990 as well? Why?
- Ashraf counts aloud like this: 2; 4; 6; ... right up to 1 000.
What do we call this range of numbers?
Will he say the number 64 as well? Why?
Will he say the number 445 as well? Why?
Will he say the number 700 as well? Why?

LO and ASs

Multiples of single-digit numbers to at least 100. (4.1.3)

Activities

- I count in multiples of 3, up to 100.
Will I count the number 12? Why?
Will I count the number 42? Why?

I count in multiples of 8, up to 100.
Will I count the number 12? Why?
Will I count the number 42? Why?

- Complete this pattern:
45; 54; 63; _____ ; _____ ; _____
These numbers are multiples of _____

LO and ASs

Place value of whole numbers of at least 4-digit whole numbers (4.1.4)

Activities

- Use Base 10 blocks to strengthen understanding of place value (units, tens, hundreds, thousands).

Possible teaching method:

- Use place value table, e.g. **2 378**

Thousands (TH)	Hundreds (H)	Tens (T)	Units (U)
2	3	7	8

- Distinguish between numeric value and place value
- Numeric value is the value of the digit in the number, e.g. in 2 378 the value of the 2 is 2 000, the value of the 3 is 300, the value of the 7 is 70 and the value of the 8 is 8.
- The place value of a digit is the place it takes in the number, e.g. in 2 378 the place value of the 2 is Thousands, the place value of the 3 is Hundreds, the place value of the 7 is Tens and the place value of the 8 is Units
(Possible introductory activity : Mental Maths Flipbooks – Activity 6, 9)

- Use place value cards to build up and break down numbers up to 4-digit numbers.

Look at the number on the place value cards and then answer the questions.

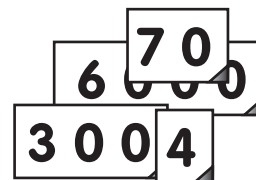


- What is the value of the 6?
- What is the value of the 3?
- What is the value of the 7?
- What is the value of the 4?
- Say the number out aloud.

Write the number 6 374 in words.

What does the digit 3 in 3642 represent? The 6? The 4? The 2? (They represent 3000 and 600 and 40 and 2.)

What is the figure 4 worth in the number 7451? And the 5?



CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem- solving.

EXTENDED ACTIVITY

None

ASSESSMENT

ASSESSMENT TASK 1 : ACTIVITY 1.1 (e.g. Tutorial)

WEEK 4

CORE CONCEPT

Rounding off
Addition

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Number board
Flard cards
Base 10 blocks
Mental Maths flipbooks
Concrete material, e.g. counters
Number lines
Hundred chart

INTEGRATION

Technology, Language

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

LO and ASs

Estimate and calculate (4.1.8) (Number range 1 to 9 999)

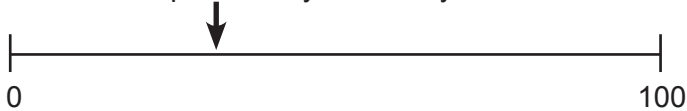
Activities

- Activity to explore estimation of numbers - Let the learners:
Estimate the number of learners in your class.
Estimate the number of learners in your school.
Estimate the number of people who live in your town, city or suburb?
Estimate a number up to about 250, explaining how the estimate was made.
For example, estimate how many: counters in a big box of them; words on one or more pages of a book; dots on a piece of dotty paper...
Explain how you worked out each estimate.

MATHEMATICAL VOCABULARY

Whole number
Value
Place value
Estimate/Approximate
Rounding off
Interval
Even number
Odd number
Multiple
Add, addition, more, plus, increase, sum of, total, altogether

- Estimate the position of a point on an undivided line: for example, the whole number marked by the arrow. Explain how you made your decision.



- Activity to explore estimation and calculation of numbers:
Which of these is the best approximation for $608 + 297$?

$600 + 200$	$700 + 300$	$600 + 300$
$600 + 97$	$610 + 300$	

Which of these is the best approximation for 19×6 ?

99×6	20×6	9×60	20×5
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Approximate: 19×16

LO and ASs

Round off to the nearest 10, 100 or 1 000 (4.1.8)

Activities

- Revise rounding off to ten (Gr 3)
- Round off in tens, hundreds and thousands (use base ten blocks, number lines, place value table)

Possible teaching method:

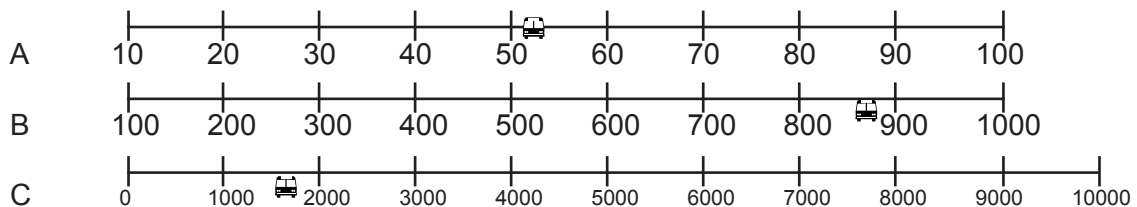
STEP 1

Divide the learners into pairs.

Distribute a sheet of blank paper to each pair

STEP 2

Draw these 3 number lines on the board:



Explain to the learners that each number line represents a long road. In A there is a petrol station every 10 km, in B every 100 km and in C every 1 000 km.

Call out a number and ask a learner to come and mark the number on the number line A, e.g. 53 (see above).

STEP 3

Explain to the learners that a tour bus ran out of petrol at 53 km.

Now ask the pairs between which two tens (petrol stations) number 53 lies (answer 50 and 60).

Ask the pairs if 3 is closer to 50 or 60 (answer: 50).

Record the answer on the board, i.e. $53 \approx 50$. (Note: \approx is the sign for approximate.)

Ask the pairs to explain the answer.

STEP 4

Use the same process to do the on number lines B and C.

Other examples

633 is 630 rounded to the nearest ten.

837 is 840 rounded to the nearest ten.

935 is 940 rounded to the nearest ten.

433 is 400 rounded to the nearest hundred.

856 is 900 rounded to the nearest hundred.

650 is half way between 600 and 700.

The nearest hundred to 650 is 700, because we round up when the number is half way between two hundreds.

Write a number between 600 and 700 which is nearer to 700 than to 600.

In your group/class, see who can estimate the answer of the following sum in one minute. (Do not try to accurately calculate the answer.)

$$\begin{array}{r} 4\ 595 \\ 1\ 389 \\ \quad 783 \\ 2\ 044 \\ 9\ 132 \\ \quad 897 \\ + \quad 75 \\ \hline \end{array}$$

Now use a calculator to find out the exact answer.

Whose estimation was closest to the correct (accurate) answer?

What method of estimation did they use? (let them explain it to the whole class)

Did anyone round off to the nearest 10; 100; 1 000?

- Use concept of rounding off, in problem solving context e.g.
Round off the money that Mrs Patel spent on the following items. Round off to the nearest rand:
Bag of sweets: R3,99
Packet of chips: R4,15
Burger: R15,45
Cooldrink: R5,50
Orange: R2,10
Add the rounded off amounts.
Now add up the actual cost.
How far off was the rounded off (estimated) cost from the actual cost?

LO and ASs

Add whole numbers with at least 4 digits (4.1.8).

Activities

- Use concrete equipment like base 10 blocks if learners have not grasped the place value of Th H T U.
- Use blocked paper if learners have a problem in keeping numbers in their correct place.
- Possible teaching methods
- **Method 1 – breaking up both numbers**
Step 1
- Write on the board $\square\square + \square\square$. Give learners 4 single-digit numbers and ask them to make the largest total they can by using the four numbers to make 2 two-digit numbers, e.g. give the digits 4, 6, 7 and 9 $\rightarrow 94 + 76$. Discuss the answers and the mental methods used.

- Pick 2 two-digit numbers and demonstrate the expanded method of addition e.g. $46 + 38$:

$$\begin{array}{r}
 46 \\
 + 38 \\
 \hline
 70 \quad (40 + 30) \\
 14 \quad (6 + 8) \\
 \hline
 84 \\
 \hline
 \end{array}$$

- Give learners examples to work through and check their answers and methods.
- Repeat the activity with six digits and $\square\square\square + \square\square\square$. Discuss the methods and talk about the fact that these might be more difficult to calculate mentally, so using a 'vertical' method can be helpful.

- Write on the board:

	384	
	+ 267	
Talk through the method,	500	→ 300 + 200
adding hundreds, tens	140	→ 80 + 60
then units.	11	→ 4 + 7
	651	

- Check that the learners understand each step and repeat. Use arrow cards to show the expanded notation for each number if learners are having difficulties understanding the method.
- Write 6 single-digit numbers on the board. Learners work in pairs. They make 2 two-digit numbers and use the informal written method to calculate their total. Extend to learners forming and adding 2 three-digit numbers. Repeat.
- Collect answers and correct mistakes and misunderstandings.

Step 2

- Pick 2 two-digit numbers and ask learners to find their sum. Learners to show their answer on whiteboards/paper. Repeat using a two-digit and a three-digit number, then 2 three-digit numbers. Work through the additions with the learners. Identify those for which learners needed a written method. Remind them of the method using $586 + 194$.

$$\begin{array}{r}
 586 \\
 + 194 \\
 \hline
 600 \quad \rightarrow 500 + 100 \\
 170 \quad \rightarrow 80 + 90 \\
 10 \quad \rightarrow 6 + 4 \\
 \hline
 780 \\
 \hline
 \end{array}$$

- Set learners the task of choosing and adding pairs of two-digit or three-digit numbers. Discuss the methods used. Reinforce the importance of deciding whether to use a mental or written method depending on the numbers.
- Learners work individually adding up pairs of numbers. Ask them to record two additions that they can answer mentally and two that need a written method. Collect responses and correct any mistakes.

Q – What helped you to decide if you could do the addition in your head?

- In small groups set learners the challenge to find two numbers with:
 - the largest total
 - the smallest total
 - the total nearest to 500
 - a total between 800 and 900
 - an even total greater than 600.

○ **Method 2 – break up by adding units, tens and hundreds separately.**

Step 1

Let's add these numbers: $577 + 285$



Step 2

I do it like this

577
285
12 (7 + 5)
150 (70 + 80)
700 (500 + 200)

First I add the units ...
Then the tens ...
Then the hundreds ...
And then the thousands.



Step 3

Finally I add them all together

862

○ **Method 3 – by adding in columns**

Step 1

First I add the units. The units add
Up to 12 ; I write the 2 in the units
place and carry 1 ten across to the
tens column.

577
285
2



Step 2

Next I add the tens. I get 16 tens,
or 160. I write 6 in the tens place
and carry 1 hundred across
to the hundreds column.

577	Final answer	577
285		285
62		862

○ **Method 4 – by counting on**

I do it by counting on. First I add
The hundreds ...
Then the tens ... and
Then the units

$577 + 285 \Rightarrow$

$577 + 200$
$777 + 80$
$857 + 5$

answer : **862**

○ **Method 5- by compensation**

Add on to one number and subtract the added amount from the other number

$487 + 146$

$487 + 3 \rightarrow 490 + 10 \rightarrow 500$

$146 - 3 \rightarrow 143 - 10 \rightarrow 133$

therefore $487 + 146 = 500 + 133 = 633$

○ Use the method you like best to calculate the following:

- $57 + 1\,043 + 885$
- $3\,970 + 4\,856$

Compare your methods with other learners in the class.
Did everybody's work?
Did anybody show you a method that you prefer?
Who had the quickest method?

- Problem-solving
Give learners lots of practise in solving different problems involving multiplication in context

CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem- solving.

EXTENDED ACTIVITY

Increase number range. Use approved maths software.

ASSESSMENT

Informal – Observe learners' ability to work with concepts. Make notes, identify problem areas and re-teach / revise if necessary.

WEEK 5

CORE CONCEPT

Subtraction
Properties of calculations

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Number board
Flard cards
Base 10 blocks / Dienes blocks
Mental Maths flipbooks
Concrete material, e.g. counters
Number lines + empty ones
Hundred chart

INTEGRATION

Technology, Science, Language

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

LO and ASs

Subtract whole numbers with at least 4 digits - of at least thousands and thousands (4.1.8)

Activities

Start with two-digit numbers and build up to 4-digits numbers.

- Use concrete equipment like base 10 blocks if learners have not grasped the place value of Th H T U.

MATHEMATICAL VOCABULARY

Whole number Numeric value Place value Interval Even number Odd number Multiple Subtract, subtraction, take (away), minus, decrease, difference
--

- Use blocked paper if learners have a problem in keeping numbers in their correct place.
- Estimation: train learners to always first estimate the answer.
 - Write the following problem on the board:

The Australian cricket team scores 134 runs in their first innings of a cricket test. The Protea cricket team scores 298 runs in their first innings. Roughly how many runs did the Proteas score more than the Australians?

- We can use rounding off to estimate the difference between the number of runs scored by the Australian team and the number of runs scored by the Proteas.

134 runs were scored by the Australian team.

$134 \approx 100$

298 runs were scored by the Proteas

$298 \approx 300$

So, the approximate difference in the number of runs scored is: $300 - 100 = 200$

Possible teaching methods for subtraction:

- **Method 1 – by counting on**

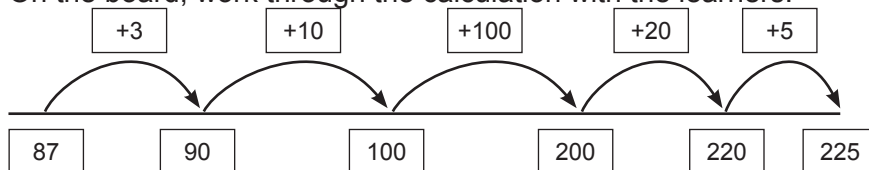
- Write the following problem on the board:

Q – A small radio costs R225. Sally has saved R87. How much more does she need to save to buy the radio?

- Discuss the problem. Ask the learners for the calculation they need to make to answer the question.

Q - How can we use the empty number line to help us do the subtraction?

- On the board, work through the calculation with the learners.



- You may wish to demonstrate how this can be set out in another way.

$$\begin{array}{r}
 225 \\
 - 87 \\
 \hline
 +3 \rightarrow 90 \\
 +10 \rightarrow 100 \\
 +100 \rightarrow 200 \\
 +20 \rightarrow 220 \\
 +5 \rightarrow 225 \\
 \hline
 \end{array}$$

$$100 + 20 + 10 + 3 + 5 = 138$$

- Demonstrate how to use this method for 3-digit numbers minus 3-digit numbers.
- Give learners other 3-digit numbers minus 3-digit numbers calculations. Collect answers, discuss methods and correct mistakes.
- Pick 2 two-digit numbers and ask learners to find the difference between the numbers

and show their answer on whiteboards/paper. Repeat using a three-digit and a two-digit number, then 2 three-digit numbers. Work through the questions with the learners.

- Discuss methods used. **Some learners may use number line or written method.** Consolidate the written method working through examples on the board e.g. $586 - 194$.

$$\begin{array}{r}
 586 \\
 - 194 \\
 \hline
 +6 \quad \rightarrow 200 \\
 +300 \quad \rightarrow 500 \\
 +86 \quad \rightarrow 586 \\
 \hline
 \end{array}$$

$$300 + 86 + 6 = 300 + 92 = 392$$

- Learners work individually subtracting pairs of numbers.
- Ask them to record two subtractions that they can answer mentally and two where they need a written method. Collect responses and correct any mistakes.

Q What helped you to decide if you could do them in your head?

- In small groups set the learners a challenge to find two numbers with:
 - the smallest difference
 - the greatest difference
 - the difference nearest 70
 - a difference between 100 and 200
 - an even greater difference.

○ **Method 2 – by counting down**

Write the following problem on the board:

South Africa scores 235 in their first innings and 183 in their second innings against England. What is the difference between the number of runs scored in their two innings?

Use counting down to subtract

$$235 - 183 = \square$$

$$235 - 100 = 135$$

$$135 - 80 = 55$$

$$55 - 3 = 52$$

$$\text{So } 235 - 183 = 52$$

○ **Method 3 – by adding on**

Find the answer by adding on

$$183 + 7 = 190$$

$$190 + 10 = 200$$

$$200 + 35 = 235$$

$$7 + 10 + 35 = 52$$

$$\text{So } 235 - 183 = 52$$

○ **Method 4 – find the answer by subtracting in columns**

H T U	Regroup
$\begin{array}{r} 235 \\ - 183 \\ \hline \end{array}$	$\begin{array}{r} 1\text{H} \quad 13\text{T} \quad 5\text{U} \\ 1\text{H} \quad 8\text{T} \quad 3\text{U} \\ \hline 0\text{H} \quad 5\text{T} \quad 2\text{U} \end{array}$
$\begin{array}{r} 52 \end{array}$	

○ **Method 5 – by compensation**

Add on to the second number to make it easier to subtract. Add the same amount on to the first number.

$$235 - 183 = \square$$

$$183 + 7 = 190; 190 + 10 = 200 \text{ (which is easier to subtract)}$$

$$235 + 7 = 242; 242 + 10 = 252$$

$$235 - 183 = 252 - 200 = 52$$

○ **Method 6 by breaking up numbers**

$$478 - 356 = \square$$

$$\text{Break up } 478 \rightarrow 400 + 70 + 8$$

$$\text{Break up } 356 \rightarrow 300 + 50 + 6$$

$$\text{Subtract} \quad \begin{array}{r} \\ \underline{356} \\ 100 + 20 + 2 \end{array} \quad \text{i.e. } 122 \text{ (add number to get the answer)}$$

○ **Problem-solving**

Give learners lots of practise in solving different problems involving subtraction in context

 **LO and ASs**

Properties of operations: (4.1.12)

Recognise, describe and use: in addition and subtraction

- commutative properties (e.g. $7 + 8 = 8 + 7$)

- associative properties (e.g. $7 + 8 + 3 = 7 + 3 + 8$)

(Use the properties and not necessarily know the names).

 **Activities**

○ Comparing number sentences when the numbers are rearranged:

- When the order of the numbers matters: (commutative)

Is $45 + 39$ the same as $39 + 45$?

Is $45 - 39$ the same as $39 - 45$?

- When the order of operations matters: (associative)

$$7 + 6 + 3 = 13 + 3 = 16$$

$$7 + 6 + 3 = 7 + 9 = 16$$

$$5 - 3 + 4 = 2 + 4 = 6$$

$$5 - 3 + 4 = 5 - 7 = -2? \text{ (Is this incorrect?)}$$

Note: Not necessary to learn the terminology of commutative and associative.

CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem-solving.

EXTENDED ACTIVITY

Problems with a more difficult context. Use approved maths software.

ASSESSMENT

ASSESSMENT TASK 1: ACTIVITY 1.2 (e.g. test) on weeks 1-5 content)

WEEK 6

CORE CONCEPT

Geometric patterns

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
2-D shapes
Matches
Mental Maths flipbooks

INTEGRATION

Arts and Culture, Language

MATHEMATICAL VOCABULARY

Geometric
Pattern
2-D shape
Rule

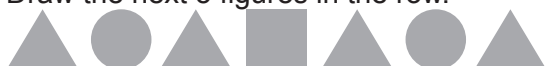
IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

LO and ASs

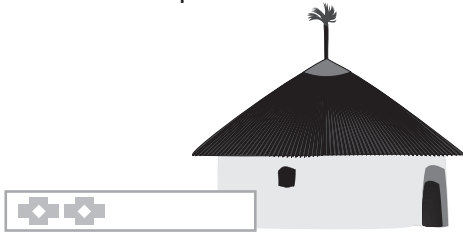
Investigates and extends numeric and geometric patterns looking for a relationship or rules. (4.2.1)

Activities

- Revision of LO 2 (Refer to work schedule).
- Grade 4 learners should continuously be exposed to concrete objects and patterns for consolidation. This will avoid misconceptions in higher grades.
- The whole idea of this assessment standard is to see patterns and to explain how patterns are repeated and extended. This can be practised and consolidated by means of many examples.
- Teach geometric patterns (shapes, forms, figures) in this sequence:
 - Identify patterns in and outside the classroom
 - Investigate pattern (in nature and cultural context)
 - Recognise given pattern
 - Describe pattern in own words
 - Extend pattern
 - Find missing object in pattern
 - Describe rule/relationship in words
 - Create own pattern.
- Possible method
 - Step 1 : Packing shapes
 - Learners should at least investigate and expand 3 patterns by using beads, matches, etc. Teaching should not only be teacher driven, but learners should also explore their own physical forms by making their own squares and triangles out of paper, sticks, matches, caps, buttons etc.
 - Step 2: Draw
 - Learners now draw what has been physically packed out.
 - Step 3 : Learners expand and complete their drawn patterns.
 - Draw the next 5 figures in the row.



- Continue the pattern



Step 4 : Describe patterns

- Describe(to your friend) in your own words, how the pattern was formed and how it's repeated.



- **Rule: Learners write patterns in own words for e.g. add 2 matches every time**

Step 5 : Design own pattern

- Learners take physical objects e.g. squares, triangles; matches etc. and physically pack out the patterns. Reinforce the names of the 2-D shapes (LO3).
- Draw own patterns on paper.
- Design your own pattern without physical objects (Homework assignment).

Step 6 : Find patterns in own environment (Homework task):

- Look for patterns in your classroom, home, nature, paint of traditional huts, Persian rugs etc. Bring examples or pictures to school.
- Draw and describe the patterns in own words. Tell the class, describe to the class and / or write in workbooks.

Steps 1 to 6 can easily integrate with A&C (visual art), Technology (structures), Languages (Advertisements and oral description of patterns).

CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem-solving.

EXTENDED ACTIVITY: Use approved maths software.

ASSESSMENT

Informal – Observe learners' ability to work with concepts. Make notes, identify problem areas and re-teach / revise if necessary.

WEEK 7

CORE CONCEPT

Numeric Patterns

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Mental Maths flipbooks
Concrete material, e.g. counters
100-blocks
Calendars
Multiplication tables

MATHEMATICAL VOCABULARY

Numeric
Pattern
Rule
Constant pattern
Non-constant pattern
Flow diagram
Input value
Output value
Function/Operation/
Formula

INTEGRATION

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

LO and ASs

Investigates and extends numeric and geometric patterns looking for a relationship or rules (4.2.1)

Activities

- Number patterns
 - Consolidation on daily basis: counting in multiples
 - Count in 3's forwards and backwards from certain numbers; also in higher number ranges.
 - Use the patterns that were packed in Steps 3 to 6 (week 6) and write down the number patterns.
- Remember that number sequences :
 - could have constant patterns e.g. $\times 3$ each time (e.g. 3, 9, 27, ...), $+2$ each time (e.g. 10, 12, 14), divide by 4 each time (e.g. 64, 16, 4, 1)
 - could have non-constant patterns, e.g. Fibonacci-patterns (e.g. 1, 1, 2, 3, 5, 8, etc.), add 1 more than to the previous number (e.g. 1, 2, 4, 7, 11, 16, etc.)
- Ideas to guide learners to get to numeric patterns or to extend numeric patterns.
 - Teacher provides numeric pattern and learner completes the pattern.
 - Describes in own words verbally or in writing.
 - Learner creates own pattern, friend completes and describes the pattern verbally and/or in writing.
 - Find number patterns in:
 - 100 blocks – colour in sequential numbers e.g. every 5 or 7
 - calendar – find patterns in weeks, every fortnight,
 - multiplication table/ grid - colour in sequential numbers – multiples, tables, explore patterns.

LO and ASs

Describe relationships or rules observed in own words. (4.2.2)

Activities

- Repeat steps in weeks 6 and 7 but put the emphasis on the learners **own verbal description** and learner should be able to explain why he/she describes the pattern in a certain manner.

- Pose questions which require insight e.g.
 - Explain how the pattern grows.
 - How did you know which numbers to fill in?
 - Explain how you worked out how many matches were needed.
 - Will ___(number) also be part of pattern?

 **LO and ASs**

Determines output values for given input values using verbal descriptions of flow diagrams. (4.2.3)

 **Activities**

- Verbal Descriptions
 - Teacher presents visual patterns and learners should continue or complete the pattern at first orally in their groups to develop confidence.
 - Then they need to support their decisions.
 - This can be explained by the following example:

One Beetle has 6 legs.



Two beetles will have 12 legs.



How many legs will 20 beetles have?

e.g.

4 beetles will have 24 legs.

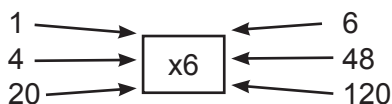
8 beetles will have 48 legs.

10 beetles will have $48 + 12 = 60$ legs.

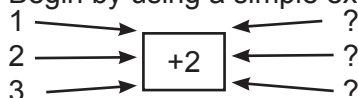
20 beetles will have 120 legs!

- Flow diagram
 - Consult a variety of sources for different forms of flow diagrams.

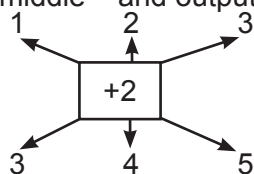
The flow diagram of the beetle example could possibly look like:



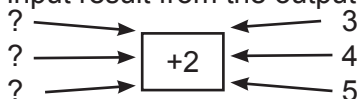
- Consolidate the following concepts:
 - Input values
 - Output values
 - Function / Formula / Operation / Rule – only one operation is allowed at grade 4 level.
 - Begin by using a simple example, e.g.



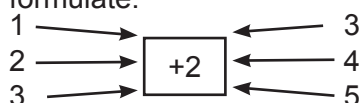
- Rotate the flow diagram vertically so that it resembles a table – this will facilitate the introduction of a table – the input values are represented at the top – rule or operation in the middle – and output value below, e.g.



- Ensure that learners are exposed to the reverse/inverse operation by requesting the input result from the output values.



- Even removing the middle operation can be done, which the learners then need to formulate.



CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem- solving.

EXTENDED ACTIVITY: Use approved maths software.

ASSESSMENT

ASSESSMENT TASK 2 : ACTIVITY 2.1 e.g. Investigation on patterns

WEEK 8

CORE CONCEPT

2-D shapes
3-D objects

RESOURCES

Gr 4 Text books
WCED Illustrative examples
MST (Maths Science Technology) Kit
Internet Web sites
Mental Maths flipbooks
Concrete material, e.g. counters
2-D shapes e.g. pattern blocks
3-D objects e.g. geometric solids

MATHEMATICAL VOCABULARY

2-D shapes (names)
Circle, Rectangle,
Square, Pentagon,
Hexagon,
Heptagon, Octagon,
Polygon
3-D objects (names)
Rectangular prism,
Sphere, Cylinder,
Prism,
Pyramid
Face - Flat surface

INTEGRATION

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

- Revision or baseline assessment of LO 3 (Refer to work schedule)

LO and ASs

Space and shape (4.3.1)

Recognise, visualize and name the following shapes and objects:

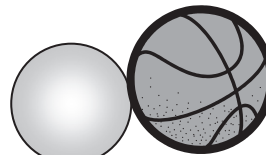
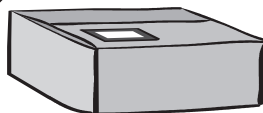
- 3D objects(inside and outside the classroom)
- rectangular prisms
- spheres
- cylinders
- prisms
- pyramids

Activities

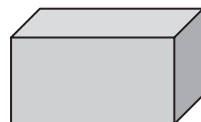
- Allow the learners to identify and name objects inside or outside the classroom which are similar to the following 3-dimensional objects:



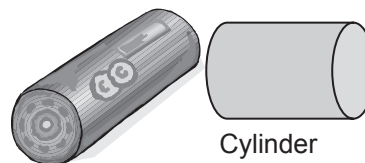
Rectangular prism



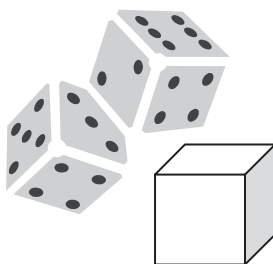
Sphere



Square prism



Cylinder



Cube



Cone

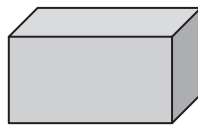


Triangular prism

- Allow the learners to recognize, identify and name these shapes in the school playground, or in the classroom:



Triangular prism



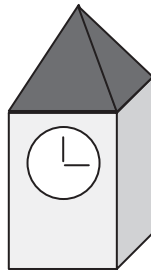
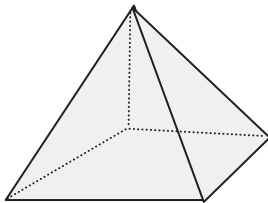
Square prism



Rectangular prism



Pyramids



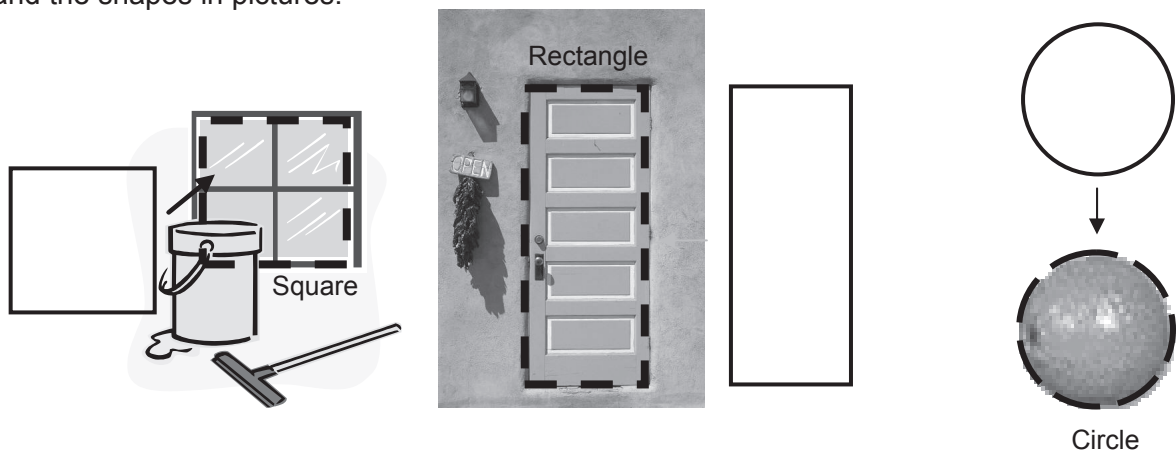
LO and ASs

Recognise, visualize and name the following shapes and objects: (4.3.1)

- 2-D shapes (inside and outside the classroom)
- Circles,
- Rectangles,
- Polygons up to 8 sides

Activities

- o They can also try to visualise how 2-dimensional shapes are similar to the shapes in objects and the shapes in pictures.



NOTE:

- An orange is NOT a circle. It is only when we look at the outline of the object, and we try to see the shape of this outline, when we think of it in a 2-dimensional context. We speak of a door (3-D) as having a rectangular shape. This activity leads to a point where learners will be able to describe the shapes of the faces of polyhedra.
 - A polyhedron (plural: polyhedra or polyhedrons) is any three-dimensional object that consists of only flat surfaces. A face is a flat surface on any polyhedron.
- o Take the learners outside and let them look at the shapes of outlines of buildings, trees, signs, etc in the environment.

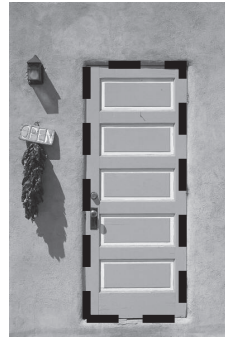
They must identify which polygons are similar to these shapes.
(Polygons are closed shapes which have straight sides).



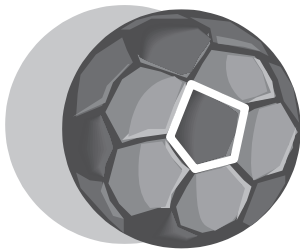
Triangle



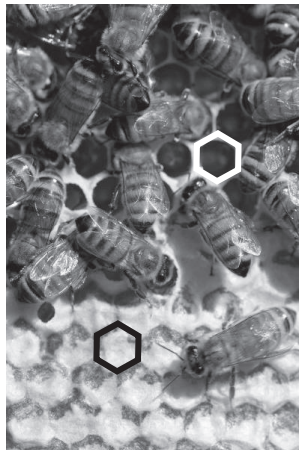
Square



Rectangle



Pentagon



Hexagon



Octagon

NOTE:

- A pine tree is not a triangle. It is only when we look at the outline of the tree that we see the shape of the outline, and we think of it in a 2-dimensional context. We are looking at the shapes of these objects.
- This activity leads to a point where learners will be able to describe the shapes of the faces of polyhedra.

CONSOLIDATION

Classwork: A number of examples need to be practised daily by learners before they can grasp the concept. Use approved maths software to consolidate the concept.

HOMEWORK/REFLECTION ON LEARNING:

A minimum of 3 examples per day for homework. Two involving calculations and one involving problem- solving.

EXTENDED ACTIVITY: Use approved maths software.

ASSESSMENT

Informal – Observe learners’ ability to work with concepts. Make notes, identify problem areas and re-teach / revise if necessary.

WEEK 9

CORE CONCEPT

Time

RESOURCES

Gr 4 Text books

WCED Illustrative examples

MST (Maths Science Technology) Kit

Internet Web sites

<http://physics.nist.gov/GenInt/Time/time.html>

http://nrich.maths.org/public/viewer.php?obj_id=6070

Mental Maths flipbooks

Watch

Clock

Hourglass

Calendar

INTEGRATION

Technology, NS

IDEAS OF METHODOLOGY & ACTIVITIES WITH EXAMPLES

- Revision or baseline assessment of time

LO and ASs

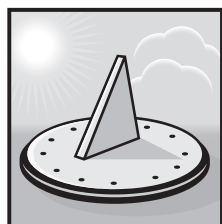
Measurement - Time

History of time (4.4.4)

- measurement
- representation
-

Activities

- Learners can be shown examples of sundials or can make their own shadow stick clocks. Remember that one day must be used to mark off the times on the hour every hour. For the few days that follow, the learners should be able to tell the time from the shadow stick. (It is important to note that the length of the shadow will change over longer periods as the seasons change.)



A sundial

- Other methods are the hourglass and the candle clock. The hourly markings must be made on the candle the day before. Similar candles can be used on subsequent days to measure time.

MATHEMATICAL VOCABULARY

Analogue time

Digital time

24-hour time

Hour/minute/second hand

AM – Before noon

PM – After noon