Foundations For Learning

Intermediate Phase
Mathematics
Lesson plans

Fourth term

Grade 6

Kindly send any response that you may have to:
Dr Jennifer J Joshua
E-mail: joshua.j@doe.gov.za

Department of Education
Sol Plaatje House
123 Schoeman Street
Pretoria
South Africa

Private Bag X895
Pretoria
0001

Tel: +27 12 312 6220
Fax: +27 12 321 6222
www.education.gov.za

Design and layout: Shereno (012) 344 2817

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FOURTH TERM OVERVIEW OF LESSON PLANS: GRADE 6 MATHEMATICS

	LO 1: NUMBERS, OPERATIONS AND RELATIONSHIPS	LO2: PATTERNS, FUNCTIONS AND ALGEBRA	LO 3: SPACE AND SHAPE	LO 4: MEASUREMENT	LO 5: DATA HANDLING
	MENTAL STRATEGIES ARE DONE EVERY LESSON				
WEEK 1	**AS 4:** Recognise the place value of digits in: - Whole numbers to a minimum of 9-digit numbers. - Decimal fractions to at least 2 decimal places. **AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of positive decimals with at least 2 decimal places. **AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including adding and subtracting in columns.				
WEEK 2	**AS 8:** Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of positive decimals with at least 2 decimal places. **AS 5:** Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators.			**AS 11:** Recognise and describe angles in 2-dimensional shapes, 3-dimensional objects and the environment in terms of: - Right angles. - Angles smaller and greater than right angles. - Angles greater than right angles.	
WEEK 3	**AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of common fractions with denominators which are multiples of each other and whole numbers with common fractions (mixed numbers). **AS 5:** Recognise and use equivalent forms of: - common fractions with 1-digit and 2-digit denominators; - decimal fractions to at least 2 decimal places; - percentages.				

WEEK 4	**AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - Finding fractions of whole numbers. - Finding percentages of whole numbers.	**AS 1:** Investigate and extend numeric and geometric patterns looking for a general rule or relationships: - of learners' own creation; - represented in tables. **AS 2:** Describe observed relationships or rules in own words.			**AS 8:** Predict the likelihood of events in daily life based on observation and place them on a scale from 'impossible' to 'certain'. **AS 9:** List possible outcomes for simple experiments (including tossing a coin, rolling a die and spinning a spinner). **AS 10:** Count the frequency of actual outcomes for a series of trials.
WEEK 5	**AS 4:** Recognise the place value of digits in: - Whole numbers to a minimum of 9-digit numbers. - Decimal fractions to at least 2 decimal places.			**AS 8:** Investigate and approximate: - perimeter using rulers or measuring tapes; - area of polygons (using square grids) in order to develop rules for calculating area of squares and rectangles. **AS 9:** Investigate relationships between the perimeter and area of rectangles and squares.	
WEEK 6	**AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - Multiplication of at least whole 4-digit by 3-digit numbers. - Division of at least 4-digit by 1-digit numbers. **AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including: - Multiplying in columns. - Long division.	**AS 12:** Recognise, describe and use divisibility rule for 2 and 5.	**AS 8:** Locate positions on a coded grid, describe how to move between positions on a grid and recognize maps as grids.		

WEEK 7	**AS 7:** Solve problems involving comparing two or more quantities of different kinds (rate). **AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of mixed numbers: - multiplication of 4-digit by 3-digit numbers; - division of 4-digit by 1-digit numbers; - finding percentages of whole numbers. **AS 10:** Use a range of techniques to perform calculation with whole numbers including: - adding, subtracting and multiplying in columns; - long division.	**AS 12:** Recognise, describe and use divisibility rule for 2; 5; 10; 100 and 1 000.	**AS 8:** Locate positions on a coded grid, describe how to move between positions on a grid and recognize maps as grids.		
WEEK 8				**AS 8:** Investigate and approximate volume/capacity of objects (by packing or filling them) in order to develop rules for volume of rectangular prisms. **AS 10:** Investigate relationships between surface area, volume and dimensions of rectangular prisms	
WEEK 9	REVISION	REVISION	**AS 6:** Natural and cultural 2-dimensional shapes, 3-dimensional objects and patterns in terms of geometric properties.	REVISION	REVISION
WEEK 10	REVISION	REVISION	REVISION	REVISION	REVISION

THE ASESSMENT FRAMEWORK: TERM 4 – GRADE 6 MATHEMATICS

	INFORMAL ASSESSMENT TAKES PLACE ON A REGULAR BASIS THROUGHOUT THE TERM					
FORMAL:	**MENTAL CALCULATIONS**	**LO 1: NUMBERS, OPERATIONS AND RELATIONSHIPS**	**LO2: PATTERNS, FUNCTIONS AND ALGEBRA**	**LO 3: SPACE AND SHAPE**	**LO 4: MEASUREMENT**	**LO 5: DATA HANDLING**
WEEK 1	NO FORMAL ASSESSMENT					
WEEK 2		**AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including building up and breaking down numbers.	**AS 4:** Write number sentences to describe a problem situation within a context.			
WEEK 3	NO FORMAL ASSESSMENT					
WEEK 4	**LO 1 AS 9:** Perform mental calculations involving addition and subtraction. **LO 1 AS 9:** Perform mental calculations involving multiplication of whole numbers to at least 12x12.	**AS 5:** Recognise and use equivalent forms of numbers including: - common fractions with 1-digit and 2-digit denominators; - decimal fractions to at least 2 decimal places. **AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - Finding fractions of whole numbers. - Addition and subtraction of positive decimals with at least 2 decimal places. **AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating.				

WEEK 5		**AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including using a calculator.	**AS 1:** Investigate and extend numeric and geometric patterns looking for a general rule or relationships: - of learners' own creation; - represented in tables.		**AS 11:** Recognise and describe angles in 2-dimensional shapes, 3-dimensional objects and the environment in terms of: - right angles; - angles smaller than right angles; - angles greater than right angles. **AS 9:** Investigate relationships between the perimeter and area of rectangles and squares.	
ASSESSMENT TASK 1 COMPLETED						
WEEK 6	NO FORMAL ASSESSMENT					
WEEK 7	NO FORMAL ASSESSMENT					
WEEK 8	**LO 1 AS 9:** perform mental calculations involving multiplicatoin of whole numbers to at least 12x12. **LO 1 AS 9:** Perform mental calculations involving addition and subtraction.	**AS 4:** Recognise the place value of digits in: - Whole numbers to a minimum of 9-digit numbers. - Decimal fractions to at least 2 decimal places. **AS 7:** Solve problems involving comparing two or more quantities of different kinds (rate). **AS 8:** Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - Multiplication of at least whole 4-digit numbers by 3-digit numbers.	**AS 12:** Recognise, describe and use divisibility rules for 2; 5; 10; 100 and 1 000.	**AS 8:** Locate positions on a coded grid, describe how to move between positions on a grid and recognize maps as grids.		AS 8: Predict the likelihood of events in daily life based on observation and place them on a scale from 'impossible' to 'certain'.

		- Division of at least 4-digit by 1-digit numbers. - Finding percentages of whole numbers. - Multiple operations of whole numbers with or without brackets. AS 10a, b: Use a range of techniques to perform written and mental calculations with whole numbers including: - Addition and subtraction of 9-digit numbers using columns. - Multiplication of 4-digit by 3-digit numbers using columns. - long division.				
ASSESSMENT TASK 2 COMPLETED						
WEEK 9	NO FORMAL ASSESSMENT					
WEEK 10	NO FORMAL ASSESSMENT					

GRADE 6: WEEK 1 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 1 AS 4, 8, 10**	**Milestones:** • Recognise the place value of digits in: - whole numbers to a minimum of 9-digit numbers; - decimal fractions to at least 2 decimal places. • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of positive decimals with at least 2 decimal places. • Use a range of techniques to perform written and mental calculations with whole numbers including adding and subtracting in columns.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Place value 9-digit numbers	Adding in columns	Subtracting in columns	Place value: 2-digit decimals	Adding and subtracting decimals
Resources:	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook

WEEK 1: DAY 1

Notes to the teacher:

- In the previous term, learners could recognise the place value of digits in an 8-digit number. In today's lesson, the focus will be on recognising the place value of digits in 9-digit numbers.
- Learners often have difficulty in reading and saying large numbers, so ensure the numbers are written with the gaps in the correct places. Also, give them plenty of practice in reading large numbers by asking them at every opportunity to say a number in words.

Resources: Chalkboard, textbook, worksheets.

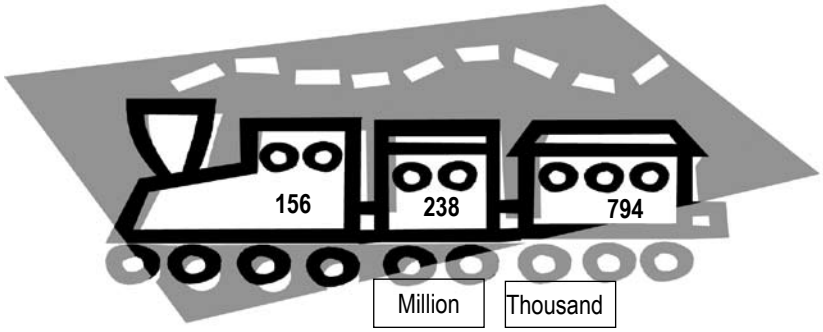
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" (see Term 2 Addendum Mental Strategies).
- Give the learners 10 addition calculations, entailing different strategies, to do. Write these on the board, the learners must write down the answers only. Use a variety of vocabulary. Examples:
  - Find the sum of 564 and 99 (learners must use compensation: 563+100).
  - What is the total of 54, 75, 18, 46, 12, 25 and 46 (learners must re-group to make 2 totals of 100, and then 18+12)?

Concept Development (25 minutes)

- Write an 8-digit number on the board, e.g. 56 238 794. Ask learners in turn to say the number to you: Fifty six million, two hundred and thirty eight thousand, seven hundred and ninety four. Ask the learners what the place value of various digits is, in random order, ending with the 5 (x10 million).
- Tell the learners you are going to write another digit in front of the number on the board. Can they think what the value of the digit would be? Before they answer, write a 1 at the front of the number on the board: 156 238 794. If the place value of the 5 is ten million, the digit to its left must be 10 times greater, therefore its place value is Hundred Million.
  - Choose a learner to come to the board and write 100 000 000 on the board. Ask a few learners in turn to read the number: one hundred million.
  - Let the learners count in hundred millions from zero to 900 000 000 and back. Ask a few learners in turn to come and write some of the numbers that they just said on the board.
  - Ask a few learners to say the original number you wrote, i.e. 156 238 794. If they have difficulty, remind them to think of the numbers in the carriages of a train:



This number is read: One hundred and fifty six million, two hundred and thirty eight thousand, seven hundred and ninety four.

- Ask learners in turn to write the number in expanded notation: (1x100 000 000)+(5x10 000 000)+(6x1 000 000)+(2x100 000)+(3x10 000)+(8x1 000)+(7x100)+(9x10)+(4x1).
- Repeat with a few more numbers, giving as many learners as possible a chance to read 9-digit numbers and write them in expanded notation. Include numbers with a zero, in which case the learners do not have to write, for example, (0x1 000).
- Say a few 9-digit numbers in words and ask learners in turn to write the numbers.
- Write a few broken down numbers (in random order) on the board and choose learners to write the number formed on the board, e.g. (5x100)+(3x100 000 000)+(2x1)+(7x 100 000)+(8x10 000 000)+(3x1 000)+(7x10)+(6x10 000). Learners will write 380 763 572. Practise saying the number each time.

Consolidation (25 minutes)

- If there are no suitable exercises in the textbook, make a worksheet or write work on the board to practise recognising the place value of digits in a 9-digit number. This work should include a few examples of each of the following:
  - Writing 9-digit numbers in words.
  - From numbers written in words, write down the 9-digit number.
  - Writing 9-digit numbers in expanded notation.
  - From expanded notation, write down the number formed.
  - Writing down the place value of underlined digits.
  - Writing numbers that are, e.g. 8 000 more than, 500 less than, 100 000 000 more than certain numbers.
  - Arranging 9-digit numbers in ascending and descending order.

ASSESSMENT	**Informal:** Assess from the learners' participation in class, their verbal responses and the class work whether they can recognise the place value of digits in a 9-digit number.

WEEK 1: DAY 2

Notes to the teacher:

- Today we will revise adding in columns. In the third term, learners were adding up to 8-digit numbers in columns, as well as adding different size numbers in columns.
- Always encourage learners to check their addition calculations by adding again in a different order from the first time they do the calculation. They must always look for ways to re-group numbers (they do not have to re-write the numbers) to make adding easier, for example, if in the units column they have to add 7, 8 and 3, they should add 7+3 and then the 8.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do counting activities. See Addendum Mental Strategies for ideas on how to vary this activity. Focus today on counting in large numbers and crossing over from, e.g. Ten Millions to Hundred Millions. Examples:
  - Count in ten millions from 160 000 000.
  - Count backwards in ten millions from 270 000 000.
  - Count in millions from 58 000 000.
  - Count backwards in millions from 173 000 000.

Concept Development (20 minutes)

- Divide your board into five or six columns to give five or six learners a working space. Write a problem such as the following on the board: *In 2005 there were 87 345 giraffes in the Kruger National Park. By 2009, this figure had increased by 3 259. How many giraffes were in the park in 2009?* Choose learners who raise their hands, saying they know how to solve the problem, to come to the board and do the calculation in their own workspace. They should do this:

	$^{1+}8$	7	$^{1+}3$	$^{1+}4$	5
+		3	2	5	9
	9	0	6	0	4

Make sure the learners line up the digits, starting with the units. They must start by adding the units columns, and then move to the left.
Although for convenience we "carry over" a 1, learners must always be aware of the place value of the digits.

  - Check each learner's calculations. If any of the learners you chose to do the calculation on the board did not do addition in columns, they will have found their method far slower and clumsier. At this stage, they must be able to add in columns, so ensure that they know how to (perhaps by sitting with them while the rest of the class is doing written work).
  - Make sure the learners write a complete answer: 90 604 giraffes.
  - Write a problem on the board entailing adding two 9-digit numbers together. For example: *In 2001, 495 128 529 people lived in Europe and 142 220 968 people lived in Russia. What was the total sum of the populations of Europe and Russia?* Ask a few learners in turn to read each of the two numbers. Choose five or six learners to do the calculation on the board. They will do this:

	$^{1+}4$	9	5	1	2	$^{1+}8$	5	$^{1+}2$	9
+	1	4	2	2	2	0	9	6	8
	6	3	7	3	4	9	4	9	7

Before learners start the calculation, they must ensure that they have copied down the numbers correctly.

- Make sure the learners write a complete answer: 637 349 497 people altogether. Ask a few learners in turn to say the number in words.

Problem Solving (15 minutes)

- Give the learners three or four problems to solve which entail adding 9-digit numbers in columns. If there are no suitable textbook exercises, make a worksheet or write problems on the board. Work with any learners who are still having difficulty with this concept. For each problem the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answers;
  - make sure their answers are complete.

Consolidation (15 minutes)

- Learners can complete at least 6 addition calculations using the column method. Write the sums on the board horizontally and the learners must write the numbers in columns, then add. They must work individually in their workbooks. Try to vary the sums, e.g.
  - 502 635 897 + 123 568 791 (adding two 9-digit numbers)
  - 415 + 2 354 + 926 125 (adding more than two different size numbers)

ASSESSMENT	**Informal:** From observing the learners who did calculations on the board and from their written work, you will be able to assess whether the learners are able to add in columns.

WEEK 1: DAY 3

Notes to the teacher:

- The focus of today's lesson is on subtraction in columns. Learners have had practice in this concept which will be extended to subtracting 9-digit numbers from each other.
- Subtraction is not commutative, i.e. 8-3≠3-8. Learners often forget to "borrow" and merely subtract the smaller digit from the larger digit. Be on the look-out for this and remedy it.
- Even though you are teaching the learners a specific method to do a calculation (an algorithm), keep them actively involved by asking questions.
- Use a variety of vocabulary, e.g. difference, minus, how much less, how many more, etc.
- Check subtraction by adding.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a variety of 10 to 15 calculations to do mentally. Say or write the sum on the board. The learners must write down the answers only. Afterwards, they can swop books and mark each other's work. Examples:
  - 16+4x9 (Learners must x before +: order of operations)
  - 586+199 (use compensation: 585+200)
  - $\frac{7}{12}$ of 144

Concept Development (25 minutes)

- Write the following problem on the board: *Our school has 1 543 learners and the school in the next town has 1 464 learners. How many more learners do we have in our school?* Let learners work this out in pairs. While they are busy, walk around and observe their methods. If any learners are not doing the calculation in columns, rectify this and help them. When they have finished, choose a learner who did the calculation correctly to come to the board to show the class what he/she did, and explain the process to the class. Add to his/her explanation if it is not clear. This is what the learner must do:

	1	4	5	$^{10+}3$	$^{10+}3$
-	1	4		6	4
	(0)	(0)		7	9

The numbers must be written down correctly, lined up with the units and the larger number on top. Subtraction starts with the units.
There is borrowing twice in succession. Make sure this is done correctly.

  - Afterwards, check by adding: 79+1 464=1 543.
  - Make sure the answer is complete: 79 more learners in our school.
- Do two or more examples in the same way where there is a 0 in the top number, for example:

	3	4	~~5~~	9	$^{10+}$~~0~~	$^{10+}$6
-	1		4	8		7
	2		0	1		9

6-7 cannot be done. We cannot borrow from the Tens column because there is a 0. We therefore have to go to the Hundreds column. The 5 becomes a 4. 1 (Hundred or 10 10s) is passed to the Tens column to make 10 (Tens). Now the units can borrow from the 10 (Tens). They become 9 (Tens) and the units becomes 16 (10 and 6 units).

- Use the 9-digit numbers from the previous lesson's example to write this problem: *In 2001, 495 128 529 people lived in Europe and 142 220 968 people lived in Russia. What was the difference between the population of Europe and Russia?* Choose two or three learners to come and do the calculation on the board, while the rest of the class works in pairs. They will do this:

4	9	4	5	$^{10+}1$	2	7	8	$^{10+}4$	5	$^{10+}2$	9
1	4	2	2	2	0		9	6	8		
3	5	2	9	0	7		5	6	1		

As always, start with the smallest number, the units. As subtraction is not commutative, we sometimes have to "borrow" from the next column to the left. Encourage learners to put a line through the number being borrowed from and write the reduced number in its place. Although we write *10+* each time we borrow, learners must be made aware that we are borrowing 10x100 or 10x1 000, whatever the case is.

  - Check by adding. When learners have had enough practice at this, it will become automatic. They will not always have to rewrite the numbers, they can add as the calculation is written, starting with the units of the bottom line, add the middle line to equal the digit in the top line.
  - Make sure the learners write a complete answer when they are doing problem solving.
  - Check that all the pairs of learners obtained the correct answer by a show of hands.
- Do at least two more problems entailing subtraction of 9-digit numbers with the learners. You can choose 6 learners at a time to do the work on the board, while other learners work in pairs.

Problem Solving (10 minutes)

- Learners can complete 2 or 3 problems entailing subtraction of up to 9-digit numbers in their workbooks. For each problem the learners must:
  - write a number sentence;
  - do the calculation in columns;
  - borrow correctly;
  - check their answers by adding;
  - write a complete answer.

Consolidation (15 minutes)

- If there are no suitable exercises in the textbook, make a worksheet or write subtraction calculations on the board for the learners to complete individually in their workbooks. Give the learners a variety of different sized numbers to subtract from each other, e.g. 78 654-259. This will ensure that they line up the units under each other always. For each subtraction sum, the learners must check by addition.

WEEK 1: DAY 4

Notes to the teacher:

- Today we will continue with the concept of place value, focussing on the place value of decimal fractions to 2 decimal places.
- Learners spent a fair amount of time on this concept during the third term, so this is revision. However, after a break from the concept, learners often get confused between Tens and tenths, and between Hundreds and hundredths.
- Learners are familiar with the equivalence of common fractions and decimal fractions. However, if you find that they do not know what a decimal fraction is, remind them that it is the calculator's way of writing a fraction.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete a table, consisting of 10 rows, entailing rounding off. Example:

Round off	To the nearest 10	To the nearest 100	To the nearest 1 000
13 687			
4 999			

Concept Development (25 minutes)

- Write an expanded number with decimal fractions to two decimal places on the board. Learners must write the number formed in their workbooks or in a rough work book, for example:

  $(5x1\ 000)+(2x\frac{1}{10})+(7x100)+(4x10\ 000)+(8x\frac{1}{100})+(7x1)+(9)$. Learners must write: 45 797,28. Ask a few learners in turn to read the number: Forty five thousand, seven hundred and ninety seven comma two eight.

  NOTE: We say "comma" for the decimal comma, even though the calculator shows a decimal point. Do not allow learners to say the numbers after the comma as "twenty eight", this is incorrect; they must say "two eight".

  - Ask the learner what the function of the comma is. It is to separate the whole numbers on the left from the fraction part to the right of the comma.
  - Repeat with two or more expanded numbers. Focus on the digits after the decimal comma. Each time ask a few learners to read the number formed.
- Now write a number on the board and choose a few learners to write it in expanded notation on the board, for example, you write: 623,45. Ask a few learners to read the number, "Six hundred and twenty three comma four five" then choose learners who will write:

  $(6x100)+(2x10)+(3)+(4x\frac{1}{10})+(5x\frac{1}{100})$

  - Repeat with a few more numbers, including numbers where there is a 0, in which case the learners must not write that place value, e.g. 4 056,28; 327,09.
- Move on to comparing decimal numbers with two decimal places. For example, write 5,6 and 5,06 on the board. Ask learners which number is greater.

- The least confusing way to compare decimal numbers such as these is to add 0s to make both numbers have the same number of digits after the decimal comma. Therefore 5,6 becomes 5,6**0**. Adding a 0 at the end of a number like this does not change its value. (This concept was taught in the third term). Then we can ask ourselves which is greater, 5,60 or 5,06. Disregard the comma if it makes it easier. Learners can see that 560 is greater than 506. Alternatively, we examine each number from left to right. Both these numbers have the same number of units. 5,06 has no tenths, whereas 5,6 has 6 tenths. Therefore, 5,6 is greater than 5,06.
- Learners might say 5,06 is greater because it has three digits. Rectify this thinking.
- Repeat with a few more examples allowing learners to explain their thinking each time.

Consolidation (25 minutes)

- Learners can complete an exercise from the textbook, if there is a suitable one, to show their understanding of place value of decimal fractions up to two decimal places. If there is no suitable exercise, make a worksheet or write work on the board to give the learners practice in this concept. Include a few examples of each of the following:
  - Writing decimal numbers in expanded notation.
  - Writing the decimal fraction formed from an expanded number (write the expanded number in random order, as done in the example above).
  - Arranging decimal numbers in ascending and descending order.
  - Identifying the place value of underlined digits. You can include up to 9-digit numbers with two decimal places.
  - Writing down the greater number out of a pair of decimal fractions (include some where one of the decimal fractions has only one decimal place).

ASSESSMENT	**Informal:** From the learners' class work and verbal responses during the lesson, you will be able to assess whether they can recognise the place value of decimal fractions up to two digits.

WEEK 1: DAY 5

Notes to the teacher:

- Today, we revise addition and subtraction of decimal fractions with two decimal places. This was done during the third term.
- Once the learners have grasped the concept of adding and subtraction in columns, adding and subtraction of decimal numbers is straightforward. The key thing is to line up the decimal commas and each digit in its correct column according to its place value.
- Today, problems will include adding numbers where there are between 0 and 2 digits after the decimal commas. If there are no digits after the comma, learners can add a comma and up to two 0s after the decimal comma. 58=58,0=58,00. The 0s AFTER the comma do not change the value of the number. Similarly, 0s added after the last digit after the decimal comma do not change the value of the number, e.g. 2,3=2,30. However, watch that the learners do not insert a 0 between the comma and a digit after the comma. They might think 0,5=0,05. This is incorrect!
- Problems entailing subtraction of decimal numbers will include decimal fractions with one decimal place minus a decimal fraction with two decimal places, in which case the learners will have to add on a 0 and do borrowing.
- Use Rands and cents as often as possible, as this is an every day example of numbers containing 2 decimal places to which the learners can relate.

Resources: Chalkboard, textbook, worksheets, calculators.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count forwards and backwards in decimals. See Term 2 Addendum Mental Strategies for ideas on how to vary this activity. Examples:
  - Count in 0,05s from 11.
  - Count backwards in 0,04s from 4,84.
  - Count in 0,25s from 13,75.
- Play ZAP using calculators. See Term 2 Addendum Mental Strategies for instructions. Do a round or two with the learners and then let them have two rounds in pairs. Focus on 2-digit decimal fractions.

Concept Development (25 minutes)

- Give 5 or 6 learners a space on the board to work out the following problem. After writing the problem on the board, choose learners who think they can solve it to come and do the calculation on the board. Other learners can work in pairs or individually to solve the problem: *Mr Fit participates in triathlons. Yesterday, he trained by doing a 12 km run, a 23,85 km cycle and a 5,9 km swim. What was the total distance that he covered?* This is how the learners must do the calculation:

	$^{1+}1$	$^{1+}2$	,	**0**	**0**
+	2	3	,	8	5
		5	,	9	**0**
	4	1	,	7	5

If the commas are lined up under each other, it is easy to line the digits up correctly in their correct place value columns. Fill up empty spaces after the comma, or after the last digit after the comma, with 0s. 12=12,00 and 5,9=5,90 (see Notes to the Teacher).
Add as usual, starting with the smallest place value, i.e. the Hundredths.

  - Check by adding again.
  - Make sure the answer is complete: 41,75 km.

- Give the learners another one or two similar problems to solve. Other learners can have the opportunity to do the calculation on the board. Check for all the areas where mistakes can be made.

• Give the learners a problem entailing subtraction of decimals to two decimal places. The concept is the same as with addition: lining up the commas and digits correctly and starting the calculation with the Hundredths. Give an example where the learners have to fill up with one 0: *Mr Fit ran 21,7km on Saturday and 18,25 km on Sunday. What is the difference between the two distances he ran?* Let a few learners do the calculation on the board:

$$\begin{array}{rrrcrr} & 1 & \not{2}^{\,10+}1 & , & 6\,7 & ^{10+}\mathbf{0} \\ - & 1 & 8 & , & 2 & 5 \\ \hline & & 3 & , & 4 & 5 \end{array}$$

Borrow as usual where necessary.

- Check by adding.
- Do at least two more similar problems with the learners.

Problem Solving (25 minutes)

• Give the learners 10 to 15 problems to solve. These should include:
  - Adding two or more decimal numbers with a variety of digits, up to two decimal places. For example, 246+1 235+15,23+11,3.
  - Subtracting decimal fractions with 2 decimal places from decimal numbers with 2 decimal places.
  - Subtracting a 2-digit decimal from a 1-digit decimal (where the learners must fill up with 0s).
  - Help any learners who are struggling with any of this work, in small groups.
• For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answer (check addition by adding again, and check subtraction by addition);
  - make sure their answer is complete.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and class work whether they can add and subtract 2-digit decimal fractions.

GRADE 6: WEEK 2 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO AS 8, 5** **LO 4 AS 11**	**Milestones:** • Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of positive decimals with at least 2 decimal places. • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators. • Recognise and describe angles in 2-dimensional shapes, 3-dimensional objects and the environment in terms of: - right angles; - angles smaller than right angles; - angles greater than right angles.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Subtracting decimal fractions	Problem solving and consolidation of work done so far	Angles (Right angles)	Angles (smaller than and bigger than right angles)	Common fractions: recognising common fractions with 1-digit and 2-digit denominators
Resources:	Chalkboard, textbook, worksheets Prepared Assessment Task	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets Prepared Assessment Task

WEEK 2: DAY 1

Notes to the teacher:

- In today's lesson, we will continue with subtraction of decimal fractions with two decimal places.
- In the previous lesson, we filled up with one 0 where necessary. Today, the focus will be on subtracting a decimal number with two decimal places from a whole number. The key thing is to line up the commas and digits in their correct columns and then subtract as usual.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners six flow charts, each comprising 6 input numbers and 2 missing output numbers to complete. By omitting the output numbers, learners have to work backwards (in reverse, using the inverse operations) to calculate the input numbers. You can draw the flow charts on the board and the learners can copy them and complete them. Include:
  - One flow chart whose operator is +.
  - One flow chart whose operator is –.
  - One flow chart whose operator is x.
  - One flow chart whose operator is ÷.
  - Two flow charts with two operators, e.g. x and then +.

Concept Development (20 minutes)

- Give the learners a problem entailing a 2-digit decimal fraction to be subtracted from a whole number: *I had R52. I bought a magazine which cost R27,48. How much money did I have left?* Some learners might do this: R27,48→R28,00 = 52 cents (R0,52). R28→R52=R24. R24+R0,52=R24,52. This is a good way to work out this problem mentally and there is nothing wrong with them doing it this way. However the easiest way, and the best way (especially for later in their schooling when the learners advance to dealing with decimal fractions containing more than 2-digits), is to subtract in columns. Choose a few learners to do the calculation on the board while others work in pairs:

	4	5	$^{10+}1$	2	,	9 $^{10+}$**0**	$^{10+}$**0**
-		2		7	,	4	8
		2		4	,	5	2

Line up the commas and digits. Fill up with 0s.
0-8 (hundredths) cannot be done so we have to borrow.
The first digit we can borrow from is the 2 (units). Pass this borrowed number to the tenths, to make it 10 (tenths). Now the 0 (Hundredths) can borrow from the 10 (tenths), which becomes 9 (tenths).
When we get to the units, we have to borrow from the Tens

- Check by adding.
- Make sure the answer is complete: R24,52.
- Do at least two more similar examples with the learners, ensuring their participation by either letting them do the calculations on the board or by questioning them as to what to do next. Avoid doing all the talking and letting the learners be passive listeners.

Problem Solving (20 minutes)

- The learners can solve a mixture of problems entailing adding and subtracting decimal fractions to two decimal places. If there are no suitable problems in the textbook, make a worksheet or write problems on the board. Focus mostly on the concept taught today, but include concepts taught in the previous lessons (adding and subtracting different size decimal fractions, as well as adding and subtracting 9-digit numbers). Give the learners at least 10 problems to solve. Walk around and help any learners who are having difficulty. For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check the answer (check adding by adding again; check subtraction by adding);
  - make sure their answers are complete.

Assessment Task (10 minutes)

- The learners can complete an assessment task to evaluate their ability to build up and break down numbers (e.g. expanded notation, adding and subtracting using expanded notation).

ASSESSMENT	**Informal:** The learners' written work will enable you to assess their grasp of subtracting decimal fractions to 2 decimal places.
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 1 AS 10: Use a range of techniques to perform written and mental calculations with whole numbers including building up and breaking down numbers.

WEEK 2: DAY 2

Notes to the teacher:
- Use today's lesson for consolidation of concepts and skills taught so far this term.
- If any learners are having difficulty with any concepts, help them individually or in small groups.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some multiplication tables practice. Focus on the 7 and 8 times tables. Start by letting a few learners recite the tables or parts of the tables, then proceed to "Clock multiplication" (see Term 2 Addendum Mental Strategies for instructions). Conclude by asking the learners 10 random multiplication sums to which they must write down the answers. Afterwards, they can swop books and mark each other's work.

Consolidation/Revision Of Work Done This Term (30 minutes)

- To keep the learners active and interested, make this time of consolidation a competition. Divide the learners into four teams. Each time a learner answers a question correctly, award his team a point. When you ask a learner from each team to solve problems or do calculations on the board, award the first person finished with the calculation correct 4 points, the second person 3 points the third person 2 points and the last person 1 point. Make sure all the learners in the class participate and have a turn to contribute to their team.
- Write a problem such as the following on the board: *The government budgets R234 569 216 for education and R198 576 320 for health services. What is the total budget for these two departments?*
  - Ask a learner from two of the teams to read each of the numbers.
  - Underline different digits and ask learners their place value.
  - Ask the teams in turn questions such as: If the budget for education was 4 million Rand more/less, what would the budget have been?
  - Choose a learner from each team who thinks he/she can solve the problem to come and do so, each in his/her own workspace on the board. Award points as above.
- Repeat with a subtraction problem (entailing subtraction of 2 9-digit numbers).
- Repeat with problems entailing adding and subtracting decimal fractions to 2 decimal places. Each time ask learners from different teams to read the numbers and ask random questions about the place value, as in the example above. You can also ask learners to write numbers in expanded notation.
- Add up the teams' points and give the winning team a reward (for example, extra time at break).

Problem Solving (10 minutes)

- Write at least two problems on the board entailing adding or subtracting decimal fractions to two decimal places. Each time the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answer (check addition by adding again, and subtraction by adding);
  - write complete answers.

Consolidation (10 minutes)

- Write four or more calculations entailing adding and subtracting, in columns, up to 9-digit numbers on the board. If the learners do not finish this in class they must do so for homework (make sure they write the work down). If any learners are still struggling with this method, work with them in small groups or individually.

ASSESSMENT	**Informal:** From the learners' responses during the competition and from their written work, you will be able to assess whether they have grasped the concepts taught so far this term.

WEEK 2: DAY 3

Notes to the teacher:

- The focus of the next two lessons is on angles.
- Learners were taught to recognise right angles in 2-d shapes, 3-d objects and the environment in Grade 5. They are familiar with the concept of a right angle through learning about properties of shapes and objects.
- It is worth taking the time to explain what we mean by an angle. When two straight lines meet, an angle is formed. The hands of a clock are a good example of angles. As the minute hand moves around, different angles are formed. When the time is 3 o'clock or 9 o'clock, a right angle is formed between the two hands of the clock.
- Today's lesson will focus on right angles.

Resources: Chalkboard, textbook, worksheet.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

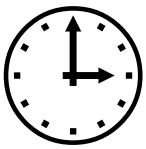
- Write ten number sentences on the board. The learners must write down the answers only. Afterwards, the learners can swop books and mark each other's work, for example:
  - y+24=192. y=?
  - $\frac{y}{5}$=10. y=?
  - 256-y=135. y=?
- If there is time, do a round of "Tables King" (see Addendum Mental Strategies for instructions).

Concept Development (20 minutes)

- Ask the learners if they can tell you what we mean by an "angle". Listen to a few responses.

  If nobody can tell you clearly, draw two lines on the board:  . Tell the learners that when two straight lines meet, an angle is formed.
  - Ask the learners to take out their scissors. We can say the blades of the scissors are lines. When the scissors are closed, there is no angle. Ask the learners to open their scissors a bit and hold them open. The two blades have now formed an angle.
  - Tell the learners to turn their scissors around and hold them in different directions. Ask them if the angle formed between the blades is still the same. They should be able to tell you that it is:

Use an analogue clock in the classroom if you have one. Ask a learner to come and move the hands to show 3 o'clock. (If you do not have a clock, the learners can draw clocks showing the different times according to your instructions.) When the learner has done that, ask the class if they know what we call the angle that has been formed by the two hands of the clock. It is a right angle.

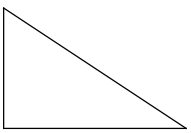
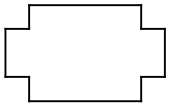


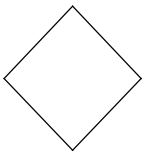
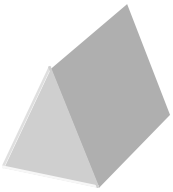
Ask another learner to move the hands of the clock to show 9 o'clock. Even though the angle is the opposite way round from a clock showing 3 o'clock, the two hands of the clock have formed a right angle:  .

- In their groups, learners can write down as many objects that they can see or think of that contain right angles. After a minute or two, see how many objects each group wrote down and let the group which wrote down the most read their list. Get each group a turn to add one or two more objects that they thought of that were not mentioned by the group which read their list. Objects include: the wall meeting the floor, the windows, the chalkboard, the corners of a book, the rugby posts, the corners of the desk, etc.
- Hold up a die or any cube (a chalk box for example) or rectangular prism (a fairly thick book will do). Ask the learners to tell you how many faces the object has (6). Then ask how many right angles on each face (4). Finally, ask how many right angles are on the object (6x4=24). Point out to the learners that even though we cannot see all the right angles, they are there.

Consolidation (20 minutes)

- Give the learners a worksheet containing pictures of geometrical shapes and objects and objects from the environment. If you cannot make a worksheet, draw a table such as the following on the board. You might find a suitable exercise in the textbook:

Shape or object: Mark all the right angles you can see.	How many right angles can you see?	How many right angles altogether? (some you cannot see but they are there)
		
		
		
		

Shape or object: Mark all the right angles you can see.	How many right angles can you see?	How many right angles altogether? (some you cannot see but they are there)
		Learners can count the bricks. Each brick has 24 right angles.
		
		
		Note: this triangular prism has 3 rectangular faces, each with 4 right angles. Therefore there are 12 right angles. Learners might have difficulty seeing that they are right angles.

Problem Solving b(10 minutes)

- Give the learners two problems to solve entailing adding and subtracting decimal fractions to 2 decimal places. For each problem the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answers;
  - make sure their answer is complete.

ASSESSMENT	**Informal:** The learners' completed class work will enable you to assess whether they can recognise right angles.

WEEK 2: DAY 4

Notes to the teacher:

- Hopefully the learners are able to recognise right angles enabling you to focus on angles smaller than right angles and bigger than right angles in today's lesson.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a multiplication grid to complete. If you cannot copy a grid for the learners, they can make their own by drawing columns in their workbooks. Today they can fill in the 2 to 7 times tables. Give the learners a time limit to make it a speed test:

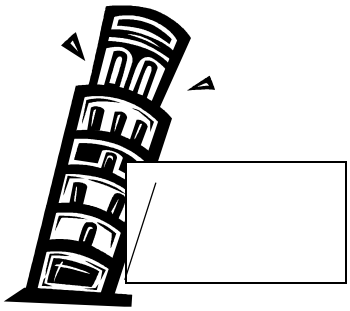
x	2	3	4	5	6	7	8	9	10	11	12
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Concept Development (25 minutes)

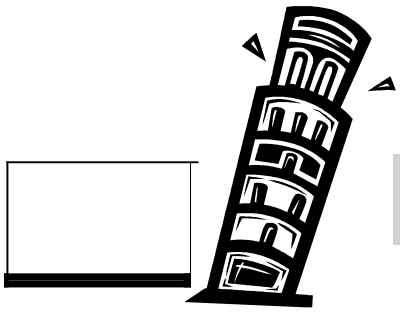
- Draw a sketch of a building (house or high-rise) on the board. Ask the learners what kinds of angles are formed between the bottom of the building and the ground. They are right angles.

  - Ask the learners if buildings always meet the ground at right angles. Some learners might say that they do. If anyone says that they do not, ask them where they have seen a building that does not meet the ground to form a right angle.
  - Draw a sketch of the famous leaning Tower of Pisa (Italy) on the board. Ask two learners to come and show you the angles where the tower meets the ground. Ask them if they are right angles. They are not.

- Ask the learners which angle is bigger than a right angle. It is the one on the left. Ask them which angle is smaller than a right angle. It is the one on the right. Show the learners by holding a piece of paper over the angle, matching the corners. The corners of the paper are right angles:

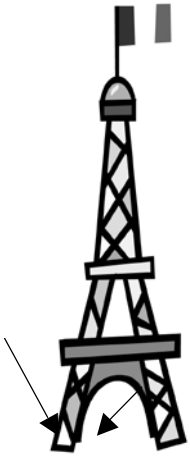


This angle is smaller than a right angle.



This angle is bigger than a right angle.

- Draw a sketch of the Eiffel Tower in Paris, France, on the board. Ask learners go come and show you the angles where the bottom of the tower meets the ground. They should be able to tell you which angle is bigger than a right angle and which one is smaller than a right angle:



Ask learners in turn to draw clocks on the board (or move the hands on a classroom clock if you have one) to show different times. Each time ask the learners if the angle formed by the hands is a right angle, smaller than a right angle or larger than a right angle, for example: 1 o'clock, smaller than a right angle; 4 o'clock, larger than a right angle.

- Ask learners in turn to come to the board and draw two lines that meet at a right angle, an angle smaller than a right angle and an angle larger than a right angle.
- Open a book a little way.  Ask the learners if the pages form a right angle, an angle smaller than a right angle or an angle larger than a right angle. The angle is smaller than a right angle. Open the book wider  and let the learners tell you that the pages now form an angle bigger than a right angle.
- Draw a tree with a few branches at different angles. Ask learners in turn to come and point out angles that are right angles, smaller than right angles and bigger than right angles.

Consolidation (25 minutes)

- Give the learners a worksheet containing pictures of 2-d shapes, 3-d objects and pictures from the environment or of every day objects. There are examples in the Addendum: shapes for recognising angles. They must:
  - mark the right angles with a red square ();
  - mark the angles smaller than right angles with a blue dot (•);
  - mark the angles bigger than right angles with a green cross (x).
- Learners can draw 2-d shapes and 3-d objects (geometric and from the environment) which contain angles. They must mark the angles in the same way as above.

ASSESSMENT	**Informal:** From the learners' verbal responses and their completed task, you will be able to assess whether they can recognise angles which are right angles, smaller than right angles and larger than right angles.

WEEK 2: DAY 5

Notes to the teacher:

- In today's lesson, the focus is on common fractions.
- Learners should by now be familiar with recognising fractions, making equivalent fractions, mixed numbers and improper fractions, as well as adding and subtracting mixed numbers. However be thorough when revising these concepts. Some learners are a bit afraid of and negative towards fractions, but thorough knowledge of fractions is important to enable the learners to do Maths at a higher level (e.g. high school Algebra). Try to break down any negative feelings towards fractions.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Learners can complete the multiplication grid that they started in the previous lesson. Challenge them to complete it in 5 to 6 minutes. Afterwards, they can check each other's grids. If there is time, do some random tables asking individual learners to answer sums, e.g. 6x7. They must answer as quickly as possible.

Concept Development (20 minutes)

- Write work entailing fractions on the board. In pairs, the learners must write down the answers as quickly as possible. Afterwards, let the pairs swop books and see which pair obtained the most correct answers. As you go through the answers with the learners, ascertain if there are any particular areas of weakness and do several examples with the learners to remedy this. Give the winning pair of learners a reward. Below are examples of questions; you can ask a few of each kind using different numbers. The learners should be able to answer 20 to 25 such questions:
  - Write down a fraction with numerator 5 and denominator 8.
  - Write down a fraction with numerator 8 and denominator 5. What kind of fraction is this?
  - Write down three equivalent fractions for $\frac{2}{3}$.
  - Write $\frac{12}{7}$ as a mixed number.
  - Arrange in ascending order: $\frac{3}{5}$, $\frac{5}{8}$, $\frac{7}{10}$.
  - Fill in >, < or =: …(give a few pairs of fractions).
  - Write the following fractions in their simplest form: …(give a few fractions).
  - Complete: $\frac{3}{8}=\frac{9}{?}$ (give the learners a few like this)
  - Write $4\frac{2}{3}$ as an improper fraction.

Consolidation (15 minutes)

- Find an exercise in the textbook to give the learners additional practice in the above concepts. If there is no suitable exercise, make a worksheet or write work on the board. Pay particular attention to areas of weakness that you found during the lesson. Work with groups of learners who are having difficulty with any of these fractions concepts.

Problem Solving (15 minutes)

- Learners can solve problems entailing adding and subtracting up to 9-digit numbers in columns and adding and subtracting decimal fractions up to 2 decimal places. You can also include multiplication (4-digit by 2-digit numbers) and division (4-digit by 2-digit numbers), which was done in the third term. Give the learners at least 6 problems to solve. For each problem, the learners must:
  - write a number sentence (do a formal assessment on this aspect of the work);
  - do the calculation;
  - check their answers;
  - make sure their answers are complete.

ASSESSMENT	**Informal:** Assess from the learners' work in pairs and their written work whether they understand the basic concepts of fractions.
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 2 AS 4: Write number sentences to describe a problem situation within a context.

GRADE 6: WEEK 3 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 1 AS 8, 5**	**Milestones:** • Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of common fractions with denominators which are multiples of each other and whole numbers with common fractions (mixed numbers). • Recognise and use equivalent forms of: - common fractions with 1-digit and 2-digit denominators\decimal fractions to at least 2 decimal places; - percentages.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Adding Mixed numbers	Subtracting Mixed numbers	Consolidation: fractions	Percentages and common fractions	Percentages and decimals
Resources:	Chalkboard, textbook, worksheet	Chalkboard, textbook, worksheet	Chalkboard, textbook, worksheet	Chalkboard, textbook, worksheet	Chalkboard, textbook, worksheet, calculators

WEEK 3: DAY 1

Notes to the teacher:

- In today's lesson, the focus is on adding common fractions whose denominators are multiples of each other and mixed numbers.
- This is not a new concept to the learners who were taught it in the second and third terms.
- Today, the learners will progress to adding three mixed numbers together. This must be done in one calculation which entails finding a common denominator for the three denominators.
- Ensure that the learners work step by step, with each step of the calculation under the previous one. This encourages and develops logical and clear thinking which will hold them in good stead for high school Algebra.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Revise multiples. Start by counting in multiples (see Term 2 Addendum Mental Strategies for ideas on how to vary this activity). Examples:
  - Count in multiples of 4 from 24.
  - Count backwards in multiples of 5 from 95.
  - Count in multiples of 15 from 15.
  - Count in multiples of 7 from 28.
- The learners can then complete a written task entailing multiples. Give them 10 tasks to complete. Afterwards they can swop books and mark each other's work. Examples:
  - Write down the first 8 multiples of 3 and 5. Circle the common multiples. Write down the lowest common multiple.
  - Find the lowest common multiple of 4, 5 and 10.
  - Write down all the multiples of 7 between 20 and 45.

Concept Development (20 minutes)

- Write a problem on the board such as the following (you can say the problem, but write the fractions/mixed numbers): *At a recent pizza eating competition, James ate* $3\frac{3}{5}$ *pizzas and Thomas ate* $2\frac{7}{10}$ *pizzas. How much pizza did they eat altogether?* Ask the learners if they know how to solve this. Choose five or six learners who say that they know to come to the board and do the calculation, each in his/her own workspace. The rest of the class can work it out on paper or in their workbooks. This is what they must do:

$3\frac{3}{5}+2\frac{7}{10}$

$= 5+\frac{3}{5}+\frac{7}{10}$

$= 5+\frac{6}{10}+\frac{7}{10}$

$= 5+\frac{13}{10}$

$= 6\frac{3}{10}$ pizzas.

Add the whole numbers first.
The lowest common multiple (denominator) of 5 and 10 is 10.
Change $^{3}/_{5}$ to $^{6}/_{10}$ by multiplying the numerator and denominator by 2.
Add the denominators: 6+7=13 (Some learners might want to add the numerators as well: rectify this).
Change $^{13}/_{10}$ to a mixed number: $1^{3}/_{10}$.
Add the whole numbers: 1+5=6.
Make sure the learners do each step of the calculation under the previous one, with the = signs lined up.

- After the learners have finished, go through the sum step by step, asking questions to ensure the learners are paying attention. Ask the class which learners did not get their sum correct and check where they went wrong.

• Give the learners another problem, entailing adding three mixed numbers together. Choose another five or six learners to work on the board. Example: *Moses was ill before the last pizza eating competition, so he wanted to challenge James and Thomas. They had another competition in which James ate* $3\frac{3}{4}$ *pizzas, Thomas ate* $3\frac{5}{8}$ *pizzas and Moses ate* $3\frac{11}{16}$*pizzas. How much pizza did they eat altogether?* This is what the learners must do:

$3\frac{3}{4}+3\frac{5}{8}+3\frac{11}{16}$

$= 9+\frac{12}{16}+\frac{10}{16}+\frac{11}{16}$

$= 9+\frac{33}{16}$

$= 11\frac{1}{16}$ pizzas altogether.

Do not let the learners do two separate calculations. They can add all three mixed numbers in one calculation.
Change all the fractions to fractions with denominators 16 by multiplying the numerator and denominator by the same number.
Add the numerators: 12+10+11=33.
Change the improper fraction to a mixed number: $^{33}/_{16} = 2^{1}/_{16}$.
Add the whole numbers.

- Go through each step with the learners, making sure that they all understand.
- Do another problem entailing adding three mixed numbers, giving other learners a chance to work on the board.

Problem Solving (15 minutes)

• Learners can work individually in their workbooks to solve at least 5 problems entailing adding fractions and mixed numbers. If there are not suitable exercises in the textbook, make a worksheet or write problems on the board. Make sure there is a variety of types of problems, i.e. adding fractions only, adding a fraction and a mixed number, adding two mixed numbers, and adding three mixed numbers. For each problem, the learners must:
  - write a number sentence;
  - do the calculation (with each step under the previous step);
  - check their answers;
  - make sure their answers are complete.

Consolidation (15 minutes)

• Give the learners 6 or more calculations entailing adding fractions and mixed numbers. Give them a variety as done in problem solving.

WEEK 3: DAY 2

Notes to the teacher:

- Continuing from the previous lesson, today we will focus on subtracting mixed numbers.
- After revising the concept, we will progress to adding and subtracting in one calculation by working from left to right.
- Keep the learners involved in any explanations by asking them questions. Do not let them become passive listeners while you do all the talking.
- Subtraction is not commutative, i.e. 4-2≠2-4. When the second fraction (part of the mixed number) is larger than the first fraction, learners have to convert a whole number to a fraction in order to "borrow" and complete the calculation. Although this is not new to the learners, they do forget and it is a concept that requires a great deal of practice.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- In a previous lesson, the learners completed a multiplication grid. They can use this grid (if necessary) to assist them in completing 15 to 20 rows of sums such as the following:

8x7=	7x8=	y÷8=	y÷7=
12x11=	11x12=	y÷11=	y÷12=
9x6=	6x9=	y÷6=	y÷9=

Concept Development (30 minutes)

- In pairs, learners can solve a problem such as: *I bought* $3\frac{3}{4}$ *metres of fabric to make clothes. I only used* $2\frac{7}{8}$ *metres. How much did I have left?* While the learners are busy, walk around and check what they are doing, correcting any mistakes you see being made. This is a calculation which entails "borrowing", so the learners might need particular help with this.
  - When most of the learners have finished, do the calculation on the board. Make sure that the learners participate by asking them what to do next. Alternatively, ask learners in turn to complete each step of the calculation which must be done as follows:

$3\frac{3}{4}-2\frac{7}{8}$

$= 1+\frac{6}{8}-\frac{7}{8}$

$\downarrow$

$= \frac{8}{8}+\frac{6}{8}-\frac{7}{8}$

$= \frac{14}{8}-\frac{7}{8}$

$= \frac{7}{8}$ metres left.

Subtract the whole numbers. Change both fractions to fractions with denominator 8.

Subtract the numerators. We cannot subtract 6-7, so we go to the whole number and change 1 to $^8/_8$ (keep to the same denominator). Remember that $^8/_8$ is equivalent to 1.

Add the numerators: 6+8=14, and then subtract 7.

  - Do another similar problem in the same way.
- Give the learners a problem which entails addition and subtraction. In the previous lesson, they learnt to add three mixed numbers in one calculation. Similarly, they must work from left

- to right in this problem: *At the start of summer, the oak tree was* $7\frac{2}{5}$ *metres tall. The farmer cut off* $2\frac{7}{10}$ *metres. During the summer, it grew another* $1\frac{9}{20}$ *metres. How tall was the oak tree by the end of summer?*
  - Let the learners solve the problems in pairs or let most of the class work in pairs and choose a few learners to come and work on the board. Afterwards, go through the calculation step by step, emphasizing that it must be done as one calculation (i.e. do not subtract, obtain an answer and then add the third fraction to the answer. By doing that the correct answer will be obtained, but it is cumbersome.) The calculation will look like this:

$7\frac{2}{5} - 2\frac{7}{10} + 1\frac{9}{20}$

$= 6 + \frac{8}{20} - \frac{14}{20} + \frac{9}{20}$

$= 5 + \frac{20}{20} + \frac{8}{20} - \frac{14}{20} + \frac{9}{20}$

$= 5 + \frac{23}{20}$

$= 6\frac{3}{20}$ metres tall.

Work from left to right to subtract then add the whole numbers (7-2+1=6). Change the fractions to denominator 20.

Work from left to right. 8-14 cannot be done. Take 1 from the 6 (=5) and change 1 to $^{20}/_{20}$.

Add and subtract the numerators from left to right: 20+8-14+9=23.

Change $^{23}/_{20}$ to $1^{3}/_{20}$ and add the whole numbers.

  - Do at least one more similar problem with the learners. You can vary the order of operations, e.g. to + + -.

Problem Solving (20 minutes)

- The learners can solve 4 to 6 problems, individually in their workbooks. If there are any learners who are struggling with this concept, help them individually or in small groups. Half the problems can entail subtraction only and the other half addition and subtraction or three mixed numbers in one calculation.

ASSESSMENT	**Informal:** Assess the learners' written work to see whether they can subtract mixed numbers and fractions with denominators which are multiples of each other.

WEEK 3: DAY 3

Notes to the teacher:

- During this lesson, the learners can be given practice in adding and subtracting fractions with the same denominators and mixed numbers.
- Give them as many problems as possible to solve. While they are busy, walk around and check on their progress and methods. Work with any learners who are having difficulty.
- You can also include problems entailing adding and subtracting up to 9-digit numbers, as well as adding and subtracting decimal fractions to 2 decimal places.

Resources: Chalkboard, worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some oral adding and subtracting activities. Establish an order to go round the class. Each learner in turn must say the answer based on the question you ask and the answer of the previous learner, for example:
  - You say 48+52;
  - Learner 1 says 100;
  - You say plus 2;
  - Learner 2 says 102;
  - You say add 99;
  - Learner 3 says 201;
  - You say subtract 70;… etc.

Problem Solving (50 minutes)

- Learners can work individually in their workbooks to solve problems. Work with any individuals or small groups of learners who are having difficulty with any concepts learnt so far. Give the learners a variety of problems, focusing on common fractions but including:
  - Addition of mixed numbers: add two or three mixed numbers in one calculation.
  - Subtraction of mixed numbers; with or without “borrowing”.
  - Addition and subtraction of mixed numbers in one calculation.
  - Addition and subtraction of up to 9-digit numbers.
  - Addition and subtraction of decimal fractions to 2 decimal places (do not make all the numbers have 2 decimal places, give a variety).
- For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check the answer;
  - make sure the answer is complete.

ASSESSMENT	**Informal:** From the learners’ problem solving, you will be able to assess whether they have mastered the concepts taught so far this term.

WEEK 3: DAY 4

Notes to the teacher:

- In today's lesson, the learners will be introduced to the concept of percentages.
- They should be familiar with the word percent from obtaining marks as a percent, hearing increases in prices in percent and many statistics quoted in percent.
- Percentages are another way of writing a common fraction or decimal fraction – a percentage is a fraction with denominator 100. We can therefore convert a fraction to a percentage by making an equivalent fraction with denominator 100.

Resources: Chalkboard, textbook, worksheets.

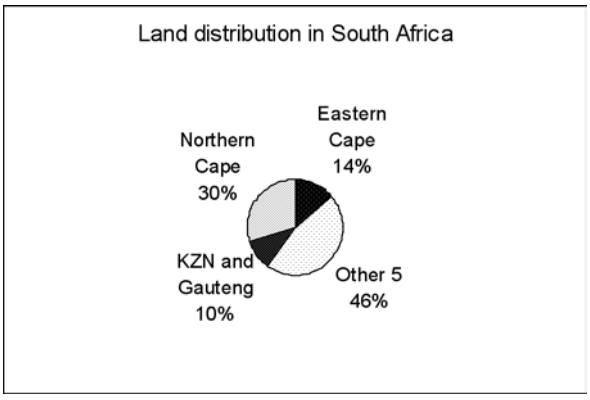
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write 15 addition and subtraction sums on the board. The learners must write down the answers only. Afterwards, they can swop books and mark each other's work. Examples:
  - 158+199=?
  - Find the sum of 127, 82, 18 and 13.
  - Find the difference between 368 and 98.

Concept Development (30 minutes)

- Draw the following pie chart on the board. Ask the learners to add the four numbers together. Ask a few learners in turn what total they obtained: 100. Explain to the learners that all nine provinces in South Africa are included in the total "pie". They have just added the numbers and found that the total is 100. Can they work out from that what the symbol % means? It means out of 100. What is the word for *out of 100*? Percent.



- See if any learners can think of any words with "cent" in them meaning 100. Some words they might think of are: cent (as in our money); century (100 years); centigrade (temperature, divided into 100 degrees); centimetre, centipede.
- Write the percent symbol on the board: %.
- Tell the learners that they have worked out that percent means out of 100. Can anyone write the Northern Cape's land area as a fraction? Ask a learner who thinks he/she can to come up and write it on the board: $\frac{30}{100}$. A percentage can be written as a common fraction with denominator 100. However, we must write the fraction in its simplest form: divide the

numerator and denominator by the same number (10). Therefore, 30% = $\frac{30}{100}$ = $\frac{3}{100}$.

- Repeat with the other provinces on the graph, giving different learners a turn to write the fraction in its simplest form on the board.
- Refer to the pie graph above to ask a few questions which do not necessarily have anything to do with Maths, but will enhance the learners' general knowledge. For example, ask them to name the other 5 provinces, ask which provinces have the most people (Gauteng and then KZN, which are also the smallest provinces).

• Write the fraction $\frac{1}{2}$ on the board. Ask the learners if anyone can change it to a percent. They might already know from school marks that it is 50%, but let them think about how to work it out. This is what they must do: $\frac{1}{2}$ =$\frac{?}{100}$. To make an equivalent fraction, multiply the numerator and denominator by the same number, in this case 50 (2x50=100): $\frac{1}{2}$ =$\frac{50}{100}$=50%.

- Repeat with $\frac{1}{4}$ (25%), $\frac{3}{4}$ (75%), $\frac{1}{5}$ (20%).

• Write the following problem on the board: *Beauty obtained the following marks for two Maths tests:* $\frac{17}{20}$ *and* $\frac{21}{25}$*. Which mark was better?* Give the learners a minute or two to think about it and try to come up with a solution in pairs. Walk around and observe what they are doing. If you see any learners get the correct answer, let them come to the board and show the class:

$\frac{17}{20}$=$\frac{85}{100}$=85%

$\frac{21}{25}$=$\frac{84}{100}$=84%

To compare anything in Maths, we have to bring them to the same, in this case %. Learners have had experience in this when they compared different fractions (making fractions with the same denominators) and decimal fractions (filling up with 0s to have the same number of decimal places in each fraction).

Beauty did better in the first test.

- Give the learners another similar problem to solve.

Consolidation (20 minutes)

• Make a worksheet, write work on the board, or find exercises in the text book to give the learners practice in:

- Converting common fractions to percentages, making sure that the denominators of the common fractions can be divided into 100 (i.e. denominators 2, 4, 5, 10, 20, 25, 50)
- Converting percentages into common fractions, e.g. write 3%, 22%, 70% as common fractions (in their simplest form)
- Comparing marks for tests by converting the common fractions to percentages.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and their completed class work whether they understand the concept of percentages and their equivalence to common fractions.

WEEK 3: DAY 5

Notes to the teacher:

- Today, we will continue working on percentages with the focus on their equivalence to decimal fractions. The learners know the place value of digits up to 2 decimal places. For example, 0,25 means 25 hundredths = $^{25}/_{100}$=25%.
- We will also focus on using the calculator to change a common fraction to a percent. Learners were taught the equivalence of common fractions and division in Grade 5: $^{1}/_{2}$ =1÷2=0.5. If we enter 1÷2 then the % key on our calculator, we will obtain an answer of 50 (percent).

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practice some multiplication tables. Begin by asking a few learners in turn, groups of learners or the whole class to recite one or two tables backwards and forwards and then do some clock multiplication. Conclude by asking the learners to write down the answers to ten random multiplication tables that you ask. Afterwards, they can swop books and mark each other's work.

Concept Development (25 minutes)

- Tell the learners to take out their calculators. Write a fraction on the board: $\frac{1}{4}$. Ask the learners what $\frac{1}{4}$ means mathematically: 1÷4. They must enter that equation into their calculators and tell you what result they obtain: 1÷4=0.25.
  - Ask them what kind of fraction 0.25 is: it is a decimal fraction. What is the place value of each digit? The 2 is tenths and the 5 is hundredths. How many hundredths do we have altogether? 25. Can we write it like this: $\frac{25}{100}$? Yes, we can. Is that the same as 25%? Yes it is. Therefore, can we say that $\frac{1}{4}$ =0.25=25%? Yes we can.
  - Repeat with a few more fractions, e.g. $\frac{3}{10}$=3÷10=0.3=0.30=$\frac{30}{100}$=30%

    $\frac{2}{5}$=2÷5=0.4=0.40=$\frac{40}{100}$=40%

- Ask the learners to look at their calculators and locate the [%] key. Explain that you can use that key to convert a fraction to a percent.
  - Write the fraction $\frac{3}{4}$ on the board. They must enter what you tell them: 3÷4 [%]. Ask them what their calculator shows: 75. We asked for % by entering the % key. Therefore, $\frac{3}{4}$ =75%.
  - Repeat with several more fractions (whose denominators are factors of 100, i.e. denominators 2, 4, 5. 10, 20, 25 and 50).

Consolidation (25 minutes)

- The learners can complete the following table in their workbooks. They can use their calculators to check their answers, but it is good practice to do the conversions without a calculator if possible. These equivalent forms are commonly used and should become familiar to the learners:

Common fraction in simplest form	Decimal fraction	Percentage
$\frac{1}{2}$		
	0.25	
		75%
	0.2	
$\frac{2}{5}$		
		60%
$\frac{4}{5}$		
	0.1	
		30%
$\frac{7}{10}$		
	0.9	

- Give the learners ten of each of the following to complete in their workbooks:
  - Change the following decimal numbers to fractions in their simplest form and percentages (e.g. 0,56; 0,44; 0,15; 0,01).
  - Change the following percentages to common fractions in their simplest form and to decimal fractions (e.g. 1%; 15%; 32%).

ASSESSMENT	**Informal:** By checking the learners' workbooks, you will be able to assess whether they can recognise the equivalent forms of common fractions, decimal fractions and percentages.

GRADE 6: WEEK 4 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 1 AS 8** **LO 5 AS 8, 9, 10** **LO 2 AS 1, 2**	**Milestones:** • Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - finding fractions of whole numbers; - finding percentages of whole numbers. • Predict the likelihood of events in daily life based on observation, and place them on a scale from 'impossible' to 'certain'. • List possible outcomes for simple experiments (including tossing a coin, rolling a die and spinning a spinner). • Count the frequency of actual outcomes for a series of trials. • Investigate and extend numeric and geometric patterns looking for a general rule or relationships: - of learners' own creation; - represented in tables. • Describe observed relationships or rules in own words.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Fractions and percentages of whole numbers	Predict likelihood of events in daily life	List possible outcomes for experiments	Count the frequency of actual outcomes for trials	Number patterns
Resources:	Chalkboard, textbooks, worksheets Prepared Assessment Task	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets, playing cards, dice, coin Prepared Assessment Task	Chalkboard, textbooks, worksheets, playing cards, dice, coins, spinners, pencils Prepared Assessment Task	Chalkboard, textbooks, worksheets Prepared Assessment Task

WEEK 4: DAY 1

Notes to the teacher:

- In today's lesson, we will revise finding a fraction of a whole number and proceed to finding a percentage of a whole number.
- As the learners know, percentages have their equivalent fraction forms. They are familiar with finding a fraction of a whole number. To find a percentage of a whole number, they must first convert the percentage to a fraction and then proceed as with finding a common fraction of a whole number (divide the whole number by the denominator and then multiply by the numerator).

Resources: Chalkboard, textbooks, worksheets, Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a variety of addition and subtraction mental calculations to complete as part of Assessment Task 1.

Concept Development (20 minutes)

- Write a problem such as the following on the board: *There were 84 apples in the box.* $\frac{1}{3}$ *of them were red apples. How many red apples were in the box?* Ask a few learners who think they know how to solve the problem, to come and do it on the board, each in his/her own workspace. 84÷3=28 apples were red.
- Write another problem with a numerator greater than 1: *65 people were on the bus.* $\frac{3}{5}$ *of the people got off the bus at Brixton. How many people were left on the bus?* Ask different learners to come and do the calculation on the board: 65÷5=13. 13x3=39 people were still on the bus.

> Divide by the denominator (this gives *one* fifth) before multiplying by the numerator (to find 3 fifths). If learners do multiply then divide, they will obtain the correct answer, but their numbers will be larger and so mistakes can be made more easily. 65x3=195. 195÷5=39

- Do another two problems, giving different learners the opportunity to do the calculation on the board. Include a problem such as: *There are 135 learners in Grade 6.* $\frac{3}{5}$ *of them are boys. How many girls are there?*

- Challenge the learners with this problem: *25% of 200 learners cycle to school. How many learners cycle?* Ask any learners who think they know how to solve this problem to come and do it on the board. Choose 4 or more learners and let them do the calculation in their own workspace. This is what they should do:

  25% = $\frac{1}{4}$

  $\frac{1}{4}$ of 200 = 200÷4 = 50 learners cycle.

> First convert the percentage to a common fraction in its simplest form and then proceed in exactly the same way as finding a fraction of a whole number.

-
- Do 3 or more problems in the same way. Include problems which become common fractions with numerators greater than 1, e.g. 60%.

Consolidation (15 minutes)

- Give the learners at least 15 calculations to complete which entail finding fractions and percentages of whole numbers. If there are no suitable exercises in the textbook, make a worksheet or write work on the board. Examples:
  - Find $\frac{5}{6}$ of 216.
  - How much is 75% of 20?

Problem Solving (15 minutes)

- Learners can solve 6 to 8 problems entailing finding fractions and percentages of whole numbers, for example: *45% of 400 people like a particular steakhouse more than any other. How many people preferred other steakhouses?* For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answers;
  - make sure their answers are complete.

ASSESSMENT	**Informal:** From the learners' participation in class and their completed class work, you can assess whether they are able to find fractions and percentages of whole numbers.
ASSESSMENT	**Formal, recorded Assessment Task:** • LO 1 AS 9: Perform mental calculations involving addition and subtraction.

WEEK 4: DAY 2

Notes to the teacher:

- The focus of today's lesson is on predicting the likelihood of events in daily life based on observation and placing them on a scale from 'impossible' to 'certain'.
- Many learners these days are enthralled by science fiction and fantasy novels or films. If this is the case with your learners, you could use this as a basis for discussion.
- This will necessitate a great deal of discussion. Listen to the learners' ideas and keep them focussed.
- Although this concept needs to be assessed for Assessment Task 2, it is logical to deal with it before moving on to predicting and listing outcomes for simple experiments.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write 15 calculations entailing finding fractions of whole numbers on the board. Learners must write the answers only in their workbooks. Afterwards they can swop books with a partner and mark each other's work. Keep the calculations simple enough to be done without any writing. Examples:
  - Find $\frac{1}{3}$ of 27.
  - Find $\frac{2}{5}$ of 35.

Concept Development (30 minutes)

- Many stories, such as science fiction and fantasy, could not possibly happen in our daily lives for many reasons. Read or tell your learners such a short story. The one below is an example you can read, but read or tell any story that will appeal to your learners.

> **The Fox and the Goat** by Aesop, a Greek writer of fables (stories which use animals and have a moral).
>
> By an unlucky chance a Fox fell into a deep well from which he could not get out. A Goat passed by shortly afterwards and asked the Fox what he was doing down there. "Oh, have you not heard?" said the Fox; "there is going to be a great drought, so I jumped down here in order to be sure to have water by me. Why don't you come down too?" The Goat thought well of this advice and jumped down into the well. But the Fox immediately jumped on her back and by putting his foot on her long horns managed to jump up to the edge of the well. "Good-bye, friend," said the Fox, "remember next time:
>
> "Never trust the advice of a man in difficulties."

- After reading the story, discuss with the learners:
  - Do you think that story is true? No.
  - Why do you say that? Learners might give answers such as: Animals cannot talk. A fox will not hear about a drought and hide in the well. The goat would not let the fox climb on his horns.
  - Do you think it is impossible that such an incident would occur? Yes.

- Tell the learners that in our daily lives there are events that might happen and others that there is absolutely no chance of happening, i.e. 0% chance. Ask learners for ideas on events that there is 0% chance of them happening. (Example: getting younger each year).
- In groups, learners can spend a few minutes listing as many impossible events as they can. Afterwards let each group read what they wrote down and give other learners a chance to disagree if they feel so.

• Tell the learners that, at the other end of the scale, we have events which are certain to happen, i.e. we are 100% sure they will happen. (Example: if today is Wednesday, tomorrow will be Thursday.) Ask three or four learners to give examples of what they consider events that are certain to happen. In their groups, let them write a list of such events and after a few minutes read them to the class.

• Draw a table such as the following on the board:

Impossible 0%				Certain 100%

- Tell the learners that you have spoken about impossible and certain events, but there are other things that happen in our lives that do not fit into those two categories. For example, "Tomorrow is Thursday; Joshua (use a learner in your class's name) will come to school." It is almost certain, but he might be ill and not come to school. What category will that fit into? Ask learners for their ideas, and write a suitable heading on the table:

Impossible 0%			Probable/likely	Certain 100%

- Give the learners another event, e.g. based on the weather patterns in your area. Ask the learners how they would predict the likelihood of rain this week as it is summer. They will agree that it is possible. Write "Possible" as a heading in the table and ask a few learners for their ideas of events that could possibly happen.

Impossible 0%		Possible (50%)	Probable/likely	Certain 100%

- Repeat and fill in the final heading, Improbable or unlikely. Ask a few learners for their ideas on unlikely/improbable events.

Impossible 0%	Improbable/unlikely	Possible (50%)	Probable/likely	Certain 100%

Consolidation (20 minutes)

- Learners can copy the table you have drawn on the board. Under each heading they must write at least 5 events. After all the discussions that have occurred, they should be able to write more but limit them to 10.
- The learners must copy a list of events in daily life that you have written on the board and they must predict the likelihood of it happening using the above headings. Examples:
  - I will grow older each year.
  - I will be ill tomorrow.
  - I will pass my next Maths test.
  - All the Grade 6s will be in Grade 7 next year.
  - If I go somewhere by train, the train will be late.
  - An aeroplane will crash somewhere in the world this year.
  - If I drop a book it will land on the floor.
  - My teacher will be angry if I do not do my homework.

ASSESSMENT	**Informal:** Assess from the learners' group work, participation in class and their written work whether they can predict the likelihood of events in daily life and place them on a scale from 'impossible' to 'certain'.

WEEK 4: DAY 3

Notes to the teacher:

- In today's lesson, we will move on to the more scientific realm of prediction by predicting possible outcomes for simple experiment.
- A classic example of this is tossing a coin. We often toss a coin to decide on something. There is an even chance, or 50-50 chance, of it landing on heads or tails, as a coin only has two sides. It has a 50% chance of landing on heads and a 50% chance of it landing on tails.
- A die has six faces. The chances of it landing, when rolled, on a particular number is 1 in 6. A pack of cards contains 52 cards. The chance of drawing out a particular card, e.g. the Ace of Hearts, is 1 in 52. However, half the pack of cards is red and half the pack of cards is black, so the chance of drawing out a red or black card is 50%.

Resources: Chalkboard, textbook, worksheets, dice, playing cards (for each group), coin, Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 20 multiplication tables calculations to complete in their workbooks as part of Assessment Task 1. You can either write the tables on the board, or say them, or say half and write the other half on the board. Make them random and include multiplication by 0.

Concept Development (20 minutes)

- Show the learners a coin. Ask questions such as: How many sides does it have? 2. What emblem is on the one side of all our coins? The Coat of Arms. What do we call the side of the coin that has the Coat of Arms? Heads. Why do we call it heads? Because in countries which have a monarch (king or queen), their head appears on all the coins. What do we call the other side of the coin? Tails. See if any learners can tell you what is on the tails sides of all our coins.
  - Tell the learners that we sometimes toss a coin. Ask them if they know when or why we do that and ask them to give you some examples (start of a cricket match to decide which team will bat first; start of a football match to decide which team will play in which direction).
  - Choose a learner to come to the front of the class and toss a coin. Before he/she does so, ask the class who thinks the coin will land on heads and who thinks it will land on tails. Ask them what the chances are of the coin landing on heads (50%) and on tails (50%). Let the learner then toss the coin – he must rest the coin on his index and middle finger of his right hand, spin the coin using his index finger into the air (not too high); the learner must catch it, put it on the back of his other hand and say what side is showing.
- Give each group of learners a pack of cards. Ask them to count the cards and check their packs to familiarize themselves with what a pack of cards consists of:

Suit												
♣ Clubs (black)	2	3	4	5	6	7	8	9	J	Q	K	A
♠ Spades (black)	2	3	4	5	6	7	8	9	J	Q	K	A
♦ Diamonds (red)	2	3	4	5	6	7	8	9	J	Q	K	A
♥ Hearts (red)	2	3	4	5	6	7	8	9	J	Q	K	A

J= Jack, Q = Queen, K = King – these are called the Face cards. A = Ace.

- Ask the learners how many cards in a pack. 52
- How many red cards are there? 26
- How many face cards are there? 12
- How many 2s are there? 4. Then ask them a few questions about the chances of drawing (i.e. taking out randomly) a card, such as:
- What are the chances of drawing a red card? (50%)
- What are the chances of drawing the Ace of Diamonds? (1 in 52)
- What are the chances of drawing a heart? (13 in 52=1 in 4 or 25%)

• If you have enough dice, give each group a die to study. Ask them questions such as:

- How many faces does the die have?
- What numbers are on the die? (Notice the opposite numbers add up to 7)
- If you roll a die, what are the chances of you getting a 2? (1 in 6)

Consolidation (15 minutes)

• If you cannot find a suitable exercise in the textbook, make a worksheet or draw a table on the board for learners to copy and complete, for example:

If I ….	**What are the chances of…**	**Chance**
Take a card out of a pack:	Getting a 2	
	Getting a red card	
	Getting a 2, 3, 4, 5, 6, 7, 8, or 9	
Roll a die:	Getting a 6	
	Getting an even number	
	Getting an odd number	
Toss a coin:	Getting heads	
Roll a die which has 2 red, 2 yellow and 2 blue faces:	Getting a red	
	Getting a red or blue	
Spin a spinner numbered 1 to 3:	Getting an odd number	

Assessment Task (15 minutes)

• Assess the learners' ability to recognise the equivalent forms of common fractions with 1-digit and 2-digit denominators and decimal fractions to at least 2 decimal places.

ASSESSMENT	**Formal:** LO 5 AS 9: List possible outcomes for simple experiments (including tossing a coin, rolling a die and spinning a spinner).
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 1 AS 9: Perform mental calculations involving multiplication of whole numbers to at least 12x12. • LO 1 AS 5: Recognise and use equivalent forms of numbers including common fractions with 1-digit and 2-digit denominators and decimal fractions to at least 2 decimal places.

WEEK 4: DAY 4

Notes to the teacher:

- Continuing from the previous lesson where learners had to predict and list outcomes of simple experiments, today learners will count the frequency of actual outcomes of experiments, e.g. tossing a coin, rolling a die.
- Learners can work in pairs or small groups, depending on how much equipment you have. After 5 to 8 minutes, learners can swop equipment with each other to conduct the next experiment and record their results.
- It will be a busy and possibly noisy lesson, but check that all learners are actively involved and not using the opportunity to play around.

Resources: Dice, playing cards, coins, spinners, pencils (hexagonal prism shape), worksheets, chalkboard, Prepared Assessment Task.

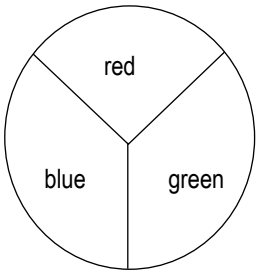
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count in decimals. See Addendum Mental Strategies for ideas on how to vary this activity. After a few oral counting activities, give the learners 10 rows of numbers to complete by continuing the pattern, e.g.
  - 5,7; 5,75; 5,8; 5,85; 5,9; …..; …..; …..; …..

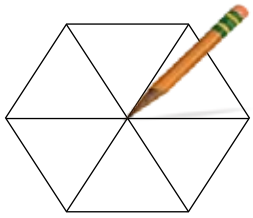
Group Work (30 minutes)

- Divide the class into small groups or pairs, depending on how much equipment you have. If you do not have too many dice or playing cards, learners can make a simple spinner very quickly. You can get some learners to make a few before the lesson to save time during the lesson. A hexagonal pencil will work as a spinner; learners can mark each face of the pencil, spin it on its point and see which face points upwards when spun.



Make a simple spinner out of cardboard. You can make a round spinner, a hexagonal spinner a square spinner. Insert a pencil through the centre of the shape and spin the pencil on its point.

Number each segment 1 – 6, or colour each segment in a different colour.



Each group of pair of learners must conduct at least three of the following experiments and record their results on a tally chart. For each experiment, the learners can swop roles e.g. recording, rolling the die, spinning the spinner, tossing the coin or drawing a playing card. Write the following instructions for experiments on the board:

- Toss a coin 40 times and record how often it lands on heads and how often it lands on tails.

- Roll a die 60 times and see how many times it lands on each number. From the results, one can also ascertain how many times it landed on an even or odd number.
- Spin a spinner with 3 different sections 30 times and see how many times it lands on each different colour /number.
- Spin a spinner (or hexagonal pencil) with 6 different sections 48 times and see how many times it lands on each colour/number.
- Draw and replace cards from a pack of cards and see how many times you draw a face card and a numbered card (A to 9).

• After each group or pair has completed three experiments, collate the results of some of the experiments on the board, for example, if 5 groups tossed a coin 40 times, the coin will have been tossed a total of 200 times. Calculate the total number of times it landed on heads and the total number of times it landed on tails. The chances are that it will be close to 100 times each.

Assessment Task (20 minutes)

• Give the learners a formal assessment task comprised of problems to assess their ability to:
  - Find fractions of whole numbers.
  - Add and subtract positive decimals to at least 2 decimal places.

ASSESSMENT	**Formal:** LO 5 AS 10: Count the frequency of actual outcomes for a series of trials.
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 1 AS 8: Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - finding fractions of whole numbers; - addition and subtraction of positive decimals with at least 2 decimal places.

WEEK 4: DAY 5

Notes to the teacher:
- The focus of today's lesson is on investigating and extending geometric and numeric patterns.
- This is not a new concept to the learners. Try to challenge them with more difficult patterns entailing larger numbers.
- Learners need to be able to look at a number pattern in table form and establish a rule for the pattern.

Resources: Worksheet, textbook, chalkboard, Prepared Assessment Task

DAILY ACTIVITIES

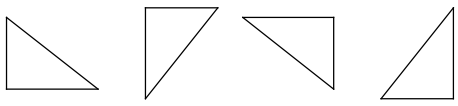
Oral and Mental Activity (10 minutes)

- Assess the learners' ability to round off to the nearest 10, 100 and 1 000 by giving them five numbers to round off.
- As an additional part of Assessment task 1, give the learners 8 – 10 calculations to do which entail rounding off or compensating, e.g.
  - 98+165
  - 268-99
  - 1 589+297

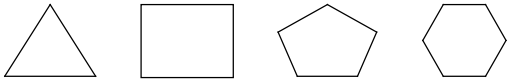
Concept Development (25 minutes)

- Draw a pattern such as the following on the board:

  - Ask learners in turn to come and draw the next shapes on the board.
  - Ask a few learners to describe the geometric pattern in words. They must be able to name each shape, i.e. pentagon and triangle, and say what is happening each time.
  - Repeat with two or three more patterns, e.g.



(See if the learners can identify the right angle and use the words "rotated clockwise".)



(Each time the number of sides increases.)

- Draw a table such as the following on the board:

Day	1	2	3	5	10	12
Hours	8	16	24			128

  - Ask the learners if they can see the rule. They must ask themselves, "What have I done to the number in the top row to obtain the number in the bottom row each time?" In the first column, what have we done to 1 to get 8? We have added 7. Does that work for the second column? No, it does not. Go back to column 1: we have multiplied by 8. Does that work for the second column? Yes it does. Therefore our rule is x8.

- Choose learners in turn to come and complete the table by filling in the missing numbers.
- Ask the learners to suggest a possible problem which we are using the table to solve? Perhaps: *We sleep 8 hours a day. How many hours will we sleep in 2, 3, 5, etc, days?* Or: *We are at school for 8 hours a day. How many hours are we at school for 2, 3, 5, etc, days?*

• Give the learners a problem such the following and then ask any learners if they can draw up a table to solve the problem. Choose five or six learners to come to the board and draw the table. *If I order goods via mail order, postage on the first 5 kg is free. Thereafter, I am charged R6 per kilogram. How much postage will I pay if my purchases total: 4 kg, 6 kg, 10 kg, 20 kg and 40 kg?* The learners will draw this table.

kg	4	6	10	20	40
Postage (R)	0				

This is a 2 part calculation, a bit of a challenge. Learners must find out how many kg are paid for by subtracting 5. Then, for each kg, they multiply by 6.

- See if any learners can work out the rule. Once they have done this, with your guidance, ask learners in turn to come and fill in the solutions:

kg	4	6	10	20	40
Postage (R)	0	6	30	90	210

• Draw a table which entails two operations. See if the learners can establish the rule and take turns to fill in the missing values, for example:

a	1	2	3	6	12	25
b	8	13	18			118

The rule is:
b=5a+3. (5 times a plus 3)

- Repeat with another similar example.

Consolidation (25 minutes)

• If you cannot find suitable exercises in the textbook, make a worksheet or write work in the board:
- Give the learners five or six tables to complete. For each table, they must fill in the missing values and write down the rule.
- Learners can draw their own tables and swop with a partner. The partner must establish the rule and complete the table.
- The learners can extend and complete geometric patterns, explaining the pattern in words. Again, they can draw these patterns and swop with a partner.

ASSESSMENT	**Informal:** Assess from the learners' participation in class and their written work whether they are able to investigate and extend geometric and numeric patterns looking for a general rule.
ASSESSMENT	**Formal, recorded Assessment Task:** • LO 1 AS 10: Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating.

GRADE 6: WEEK 5 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 4 AS 8, 9** **LO 1 AS 4**	**Milestones:** • Investigate and approximate - perimeter using rulers or measuring tapes; - area of polygons (using square grids) in order to develop rules for calculating area of squares and rectangles. • Investigate relationships between the perimeter and area of rectangles and squares. • Recognise the place value of digits in: - whole numbers to a minimum of 9-digit numbers; - decimal fractions to at least 2 decimal places.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Perimeter	Area	Perimeter and Area	Perimeter and Area Assessment task	Place value: 9-digit numbers Prepared Assessment Task
Resources:	Chalkboard, textbooks, worksheets, rulers, measuring tapes	Chalkboard, textbooks, worksheets, rulers, Square paper	Chalkboard, textbooks, worksheets, square paper Prepared Assessment Task	Chalkboard, textbooks, worksheets, square paper	Chalkboard, textbooks, worksheets, Place Value Bingo Prepared Assessment Task

WEEK 5: DAY 1

Notes to the teacher:

- In today's lesson, learners will use tape measures and rulers to approximate the perimeter of shapes.
- Perimeter means the distance around something and is measured in SI units of length, i.e. mm, cm, m and km.
- Learners were introduced to the concept of perimeter in Grade 5, so it is not totally new to them.
- Make this lesson as practical to introduce the concept. Learners enjoy taking real measurements.
- Through their measuring and investigating, the learners should be able to establish the minimum number of sides to be measured in order to find the perimeter of a shape. For example, a square has four equal sides; therefore it is only necessary to measure one side and multiply that by 5. A rectangle has two pairs of opposite sides, so it is only necessary to measure the length and breadth and multiply by 2.

Resources: Chalkboard, textbooks, worksheets, string, rulers, measuring tapes.

DAILY ACTIVITIES

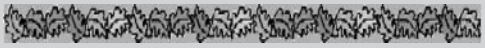
Oral and Mental Activity (10 minutes)

- Practise multiplication tables. Do a round or two of "Tables King" or "Tables Challenge" (see Term 2 Addendum Mental strategies).

Concept Development (30 minutes)

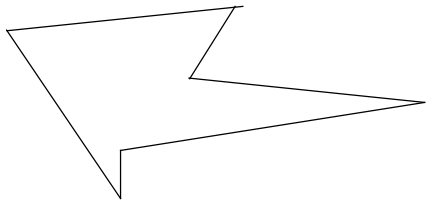
- Tell the learners that it is not too long until the December holidays and the school principal has given permission for the learners to decorate their classrooms with Christmas tinsel or ribbon. He needs to know how much tinsel or ribbon to buy. The items that can be decorated are:
  - Around the door;
  - Around the chalkboard;
  - Around each desk;
  - Around the pin board;
  - Around the bookshelves;
  - Around the teacher's desk;
  - Around each window.

Choose items that you have in your classroom that the learners can measure.



- Divide the learners into small groups.
  - They must go to each item and measure it. Make sure there is a ruler or tape measure available with which to measure each item.
  - Afterwards, they must return to their seats and write down how much ribbon they worked out is needed to go around each item.
  - Discuss their findings. Their measurements might differ slightly from one another. Discuss possible reasons for this (inaccurate measuring).
  - Tell the learners that, in each case, they measured the distance around something. See if any learners can remember what we call the distance around something: it is called the Perimeter.
  - Ask for examples of where we might need to know the perimeter of something. Learners might suggest: fencing around a garden, plot or farm; the skirting board around the classroom floor where the floor meets the wall or the amount of framing needed to frame a picture.

- Use the chalkboard as an example. Ask each group what they measured to establish its perimeter. If any groups said that they only measured the long side (length) and the short side (breadth or width), ask them to explain why. They can tell you that the opposite sides are equal, so they only need to measure those two sides and double their measurement.
- Draw a square on the board. Ask the learners how many sides they would need to measure to find the perimeter of the square. They would only need to measure one and then multiply by 4, as all four sides are the same length.
- Repeat with a regular hexagon, where only one side needs to be measured, and that distance multiplied by 6.
- Draw an irregular shape on the board. Ask the learners how many sides would need to be measured. All of them.



Consolidation (20 minutes)

- The learners can measure various items (10 or more) in the classroom to establish their perimeter. They can use their measurements to complete a table such as the following. The first row is filled in as an example:

Item	What I measured	Perimeter
Maths textbook	L=18 cm W=10 cm	(18+10)x2=56 cm
Top of my pencil case		
A floor tile		

- Find an exercise in the textbook which gives the learners practice in measuring and calculating the perimeter of different shapes. If there is no suitable exercise, make a worksheet containing some regular and irregular shapes.

ASSESSMENT	**Informal:** Observe the learners' participation in the group activity, their participation in class and see from their written work whether they understand perimeter.

WEEK 5: DAY 2

Notes to the teacher:

- Today learners will investigate area of polygons to establish a rule to calculate the areas of squares and rectangles.
- In Grade 5, learners were introduced to the concept of area. It is the space enclosed by the perimeter and is measured in square units: mm^2 (square millimetres); cm^2 (square centimetres), etc.
- A rectangle has two dimensions, length and breadth. Learners will find, through counting cm^2 enclosed in a rectangle, that if they multiply the length by the breadth they will obtain its area. Squares are special rectangles in that their length and breadth are the same.

Resources: Chalkboard, textbook, worksheets, square paper.

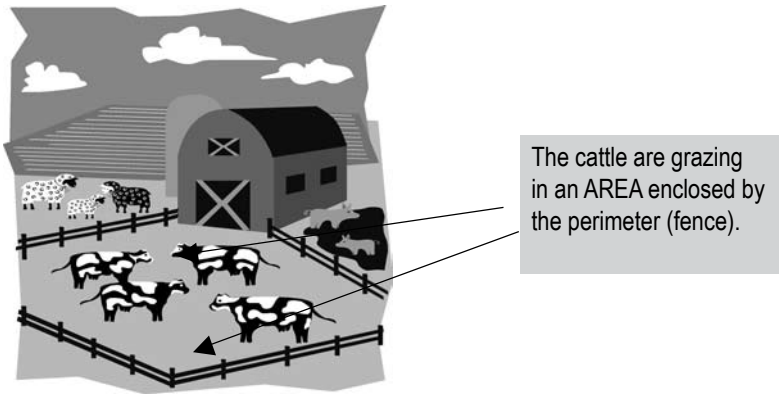
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

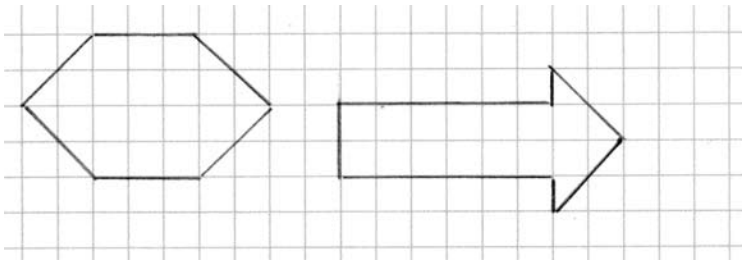
- Do some "Running Maths" (see Addendum Mental Strategies for instructions).
- Give the learners an activity to complete in which they must double and numbers. Include uneven numbers, e.g. half of 233 = $116\frac{1}{2}$. Let the learners double and halve ten 3-digit numbers.

Concept Development (30 minutes)

- On the board, draw a sketch of field or paddock enclosed by a fence. Ask the learners what we call the distance around the field. The perimeter. Choose a learner to come to the board and show you the ground that is enclosed by the fence. Ask the learners if anyone knows what we call a 2-d space enclosed by a perimeter in Mathematical language. It is the area.

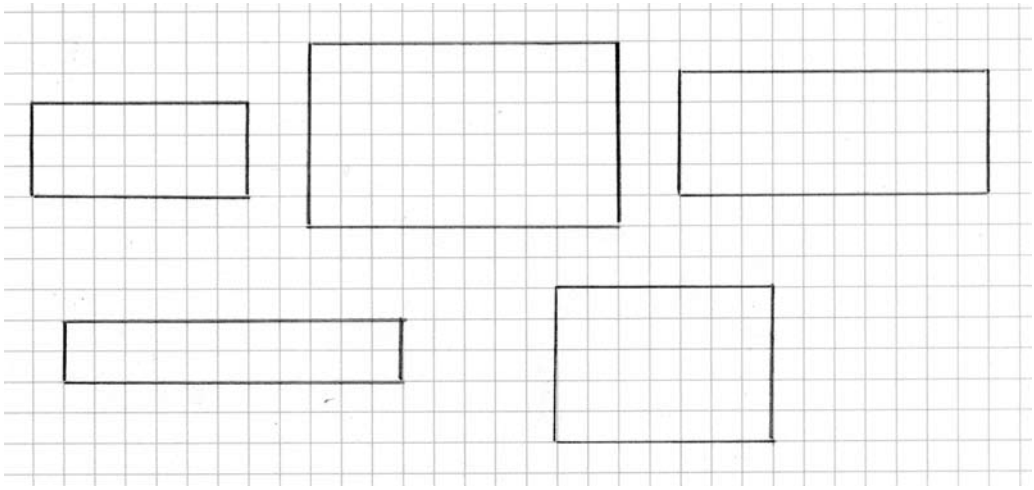


  - Ask the learners to trace around the edges of the tops of their desks; this is the perimeter. Ask them to move their hands over the writing surface of the desk. This is the area.
  - Choose a learner to come to the board and show you the perimeter of the board. Choose another learner to come and show you the area of the board – anywhere where you can write on the board is its area.
  - Tell the learners they are sitting in the classroom. It has an area. What encloses the area of the classroom? The walls which are its perimeter.
  - Think of a few more examples where learners can see what is meant by area.
- Give each pair of learners cm^2 paper with 2 or more polygons such as the following drawn on it:



- Look at the first shape. Ask the learners what it is called. A hexagon (irregular). The lines form the perimeter and they enclose the area. We can cover the area with cm^2s and there are no gaps or overlaps. Tell the learners that just as we use cm, mm, etc. for measuring length and cm^2 (said "square centimetres") are what we use to measure area.
- Explain to the learners that if something is very small, we will use square millimetres. Ask them what they think we would use to measure the area of a province of South Africa. km^2 (square kilometers).
- Ask the learners to count the squares of the hexagon and tell you its area. It is $20cm^2$ (count two half squares as a whole).
- Ask the learners to now ascertain the area of the arrow by counting the cm^2s. Its area is $16cm^2$.

• Move on to rectangles. Give each pair of learners a few rectangles drawn on square paper. They must count the cm^2s of the first rectangle to work out the area:

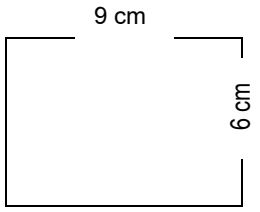


- The learners will count 21 squares in the first rectangle. Its area is thus $21cm^2$.
- Repeat with the second rectangle: $60cm^2$.
- Ask the learners if they can see a shortcut to finding the area of the rectangles. They do not need to count all the squares. They can count how many squares there are across, then how many rows there are and multiply the two numbers together.
- Look at the third rectangle. Ask a learner to count how many squares across: 10. Ask another learner how many rows of squares (or squares going down) there are. 4. 10x4=40. Get another learner to count all the squares. He will find there are 40. The area of the rectangle is $40cm^2$.
- Repeat with the last two rectangles.

- Draw a sketch of a rectangle on the board. Write its length, e.g. 7 cm and its width, e.g. 4 cm. Ask learners if they can calculate the area. It is $7x4=28cm^2$.
- Draw a sketch of a large field on the board: 100 m length and 50 m wide. Ask the learners how to calculate its area: $100x50=5\ 000m^2$.
- Draw a sketch of a square. Write its length=width=8m. Ask the learners to tell you its area: $8x8=64m^2$.

Consolidation (20 minutes)

- Find an activity in the textbook for the learners to practise calculating the area of rectangles and squares, first by counting the cm2s and then by using given measurements, for example:



-
- In some of the questions, the learners can calculate the perimeters as well. Work with learners in small groups or individually who are having difficulty with this concept. If there are no suitable exercises in the textbook, make a worksheet or write work on the board.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and their written task whether they understand how to calculate the area of rectangles and squares.

WEEK 5: DAY 3

Notes to the teacher:

- In the next two lessons, we will continue with the concept of perimeter and area of rectangles and squares, focussing on the relationships between area and perimeter.
- If the perimeter of a rectangle or square and the length of one of the sides is given, learners will calculate the length of the other side. Then, knowing the length of the other side, they will be able to calculate the area. This will be the focus of today's lesson.

Resources: Chalkboard, worksheets, textbook, Prepared Assessment Task.

DAILY ACTIVITIES

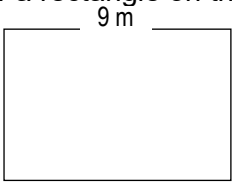
Oral and Mental Activity (10 minutes)

- The learners can practise using the reciprocal of multiplication and division by completing a table, such as the one below, consisting of 20 rows:

9x8=	8x9=	a÷9=	a÷8=
12x11=	11x12=	a÷11=	a÷12=

Concept Development (20 minutes)

- Draw a rectangle on the board and write in the measurement of its length, for example:



Perimeter = 32 m

  - Ask the learners if they can calculate the breadth of the above rectangle. Give them a few minutes to discuss it with a partner. Afterwards, go through the method on the board, filling in measurements to help them understand:

  - Repeat with another rectangle of different dimensions and having a different perimeter.
- Give the learners a problem such as: *The length of my garden is 8 m. The perimeter is 28 m. What is the area of my garden?* Draw a sketch on the board and let the learners try to solve the problem in pairs:

- Walk around the class and see what the learners are doing and help them with their thinking. After a few minutes, ask any learners who you saw obtain the correct answer to come to the board and explain what they did. Repeat what they say to ensure the explanation is clear and correct and that all the learners are following it. This is what they should do:

  2 x length = 16 m

  28 m – 16 m = 12 m

  12 m ÷ 2 = 6 m

  Area = 8 m x 6 m = 48 m^2

  Each length is the same. 2x8=16
  Subtract the 2 lengths from the total perimeter; this gives you the total of the 2 breadths. Divide by 2 to find one breadth.
  Area = LxB = 8x6 = 48 m^2

- Repeat using a rectangle with different lengths/breadths and perimeter.

• The learners must now find the length of a side of a square from being given the perimeter. Draw a square on the board. Ask the learners what the properties of a square are: it has four equal sides, it has four right angles.

Perimeter = 48 m

- The learners have just told you that the four sides of a square are the same length. Ask them what the length of each side is, if the perimeter is 48 m. We divide by 4: 48÷4=12 m. Each side is 12 m long.
- Ask the learners to calculate the area of the above square. Ask the first few learners who raise their hands to tell you the answer. The area is 12x12 = 144 m^2.
- Repeat with another square with a different perimeter. (Make sure the perimeter is divisible by 4.)

Assessment Task (20 minutes)

• Give the learners an assessment task to assess their ability to:
  - Investigate and extend numeric and geometric patterns looking for a general rule (represented in table form).
  - Recognise right angles, angles smaller than right angles and angles greater than right angles.
  - Perform calculations using a calculator.

Consolidation (10 minutes)

• If you cannot find exercises in the textbook, make a worksheet or write work on the board to give the learners practice in finding the unknown sides and areas of rectangles (where the perimeter and one side are known) and squares (where the perimeter is known). The learners can complete the work for homework.

ASSESSMENT	**Informal:** From the learners' completed class work, you will be able to see whether they understand the relationship between perimeter and area of rectangles.

ASSESSMENT	**Formal, recorded Assessment Task:** • LO 1 AS 10: Use a range of techniques to perform written and mental calculations with whole numbers including using a calculator. • LO 2 AS 1: Investigate and extend numeric and geometric patterns looking for a general rule or relationships: - of learners' own creation; - represented in tables. • LO 4 AS 11: Recognise and describe angles in 2-dimensional shapes, 3-dimensional objects and the environment in terms of: - Right angles. - Angles smaller than right angles. - Angles greater than right angles.

WEEK 5: DAY 4

Notes to the teacher:

- In the previous lesson, learners calculated the length of the unknown side and areas of rectangles when the perimeter and one side were given. They also calculated the length of each side of a square and the area of a square when they were given the perimeter.
- Today, the learners will use area and a given length of a side of a rectangle to calculate its perimeter. They will do this by dividing the area by the given length. Division is the inverse operation of multiplication. Once the length of the other side is known, the learners will be able to calculate the perimeter of the rectangle.
- To calculate the length of the side of a square from the area, learners will have to ask themselves, "What number multiplied by itself equals the area?" For example, if the area of a square is 9 cm^2, 3 multiplied by itself, i.e. 3x3 = 9.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Revise factors. Learners can write down all the factors of:
  - 12; 24; 32; 48; 54; 96.
- Learners can copy and complete the following. The answers to the multiplication sums below are all called "square numbers". Ask them why they think this is so. Learners do not need to know this.

1x1=	2x2=	3x3=	4x4=	5x5=	6x6=
7x7=	8x8=	9x9=	10x10=	11x11=	12x12=

Concept Development (30 minutes)

- Give the learners a challenge to work out in pairs. *The farmer has a rectangular vegetable garden, which has an area of 54 m^2. Write down all the possible lengths and breadths of his garden.*
  - Walk around and see what the learners are doing. If they are not making progress, give them a hint to look at the factors of 54 that they wrote down earlier.
  - When the learners have had a few minutes to find all the combinations, ask different learners to come and write the possibilities on the board. They are:

Length	Breadth
1 m	54 m
2 m	27 m
3 m	18 m
6 m	9 m

Because Area = Length x Breadth, learners must ask themselves, "What pairs of numbers, multiplied together, equal 54?" These pairs of numbers are the factors of 54.

  - Tell the learners that the farmer wants to put a fence around his vegetable garden. If his garden is 3 m wide by 18 m long, how much fencing must he buy? Choose five or six learners to come to the board and do the calculation, each in his/her own workspace:

Perimeter = (18x2) + (3x2) m
= 36+6 m
= 42 m of fencing

  - Repeat with the other three options, giving different learners a chance to do the calculation on the board. Afterwards, the learners will be able to see which dimensions need the least and which require the most fencing.

- Pose the following problem to the learners: *The area of the principal's office (which is rectangular) is 80 m² and its length is 10 m. He needs to replace the skirting (the wooden boarding that goes around the bottom of the wall, where the wall meets the floor), and found that there is 32 m in the storeroom. Is this enough to complete the work?* Let the learners work in pairs to solve the problem and choose the first one or two pairs to complete the calculation, to come and do it on the board:

- 80 m² ÷10 m = 8 m (breadth)

  Perimeter = (10x2) + (8x2)

  = 20+16

  = 36 m

  He does not have enough.

Area = Length x Breadth.
To find the breadth when given the length and area, do the inverse operation, i.e. divide.
Breadth = Area ÷ Length.
Do not give the learners rules to learn, let them rather work out the process and remember it through a lot of practice.

Some learners might mention that the skirting does not go across the door. This is correct, but do not cause confusion for the weaker learners.

  - Do another similar problem with the learners.
- Give the learners a problem to solve where they are given the area of a square. *A square tile has an area of 100 cm². What is the perimeter of the tile?* Let the learners think about it for a minute. If nobody has the solution, tell them to look at the answers they wrote for the multiplication calculations earlier in the lesson. Each side is 10 cm, because 10x10=100. Therefore the perimeter is 10x4 = 40 cm.

What number x itself = 100? 10x10=100

- Do another example where the area of a square is given and the learners have to find the length of each side and then the perimeter of the square.

Problem Solving (15 minutes)

- The learners can solve four problems to find:
  - The area of a rectangle where the perimeter and a side are given.
  - The area of a square where the perimeter is given.
  - The perimeter of a rectangle where the area and a side are given.
  - The perimeter of a square where the area and a side are given.

Consolidation (15 minutes)

- Make a worksheet, write work on the board, or find exercises in the textbooks to give learners practice in the concepts taught during the last two lessons. Work can include examples as in Problem Solving above and:
  - Drawing as many rectangles as possible with an area of, e.g. 48 cm² on square paper and then calculating the perimeter of each.
  - Drawing squares on cm² paper with perimeters of 20 cm, 24 cm and then calculating the area.

WEEK 5: DAY 5

Notes to the teacher:

- In today's lesson, we will revise place value of digits in 9-digit numbers and decimals to 2 decimal places.

Resources: Chalkboard, textbooks, worksheets, Place Value Bingo cards, calculators, Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round of "Tables King" (see Term 2 Addendum mental Strategies for instructions).
- Investigate divisibility by 2. Earlier in the term, the learners completed a multiplication grid. Using a red crayon (or any colour you choose), they must draw a circle around all the numbers that are multiples of 2. Afterwards, ask them if they can draw a conclusion or formulate a rule which states what numbers can be divided by 2: all even numbers, or all numbers which end in 0, 2, 4, 6, or 8 are divisible by 2.

Concept Development (20 minutes)

- Write a 9-digit number on the board.
  - Ask a few learners in turn to say it in words. Choose four or five learners to come to the board and write it in expanded notation.
  - Repeat with two or three other 9-digit numbers, including numbers with a zero.
  - Play "Place Value Bingo" (see Addendum Mental Strategies for instructions. If you played this in the previous term, you will need to make another set of cards to include Hundred Millions).
- Write a number comprising 3-digts, 4-digits or 5-digits and a decimal fraction with 2 decimal places on the board, e.g. 128,78; 4 597,35 or 32 587,46.
  - Ask a few learners in turn to read the number. Make sure they say, e.g. "One hundred and twenty eight comma seven eight" and *not* "…. comma seventy eight."
  - Choose a few learners to come to the board and write it in expanded notation.
  - Repeat with another one or two decimal fractions up to 2 decimal places.
- Play "ZAP" on the calculators. (See Addendum Mental Strategies) Do the first round or two with the learners and then let them play in pairs, each learner taking turns to tell the other learner what to "zap".

Assessment Task (15 minutes)

- The learners must complete a task to assess their ability to recognise the relationship between perimeter and area of rectangles and squares. Give them a task to complete similar to the work done during the lessons on perimeter an area.

Consolidation (15 minutes)

- Find an exercise in the textbook, make a worksheet or write work on the board to give the learners practice in recognising the place value of digits in 9-digit numbers and decimal fractions up to 2 decimal numbers. Examples:
  - Write different size numbers and decimal fractions (up to 2 decimal places) in expanded notation.
  - Write the numbers formed from broken down numbers.
  - Write down the number that is - for example - 2 hundredths more than 182,45.
  - Write down the number that is - for example - 4 tenths less than 586 459,87.
  - Write down the place value of the underlined digit.
  - Write down the value of - for example - 3, in each of the following numbers: 456 123 789,78; 103,25; 358 721 560; 153 626 118.

ASSESSMENT	**Informal:** Assess from the learners' participation in class and their written work whether they can recognise the place value of digits in up to 9-digit numbers and of decimal fractions up to 2 decimal places.
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 4 AS 9: Investigate relationships between the perimeter and area of rectangles and squares.

GRADE 6: WEEK 6 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 1 AS 8, 10** **LO 2 AS 12** **LO 3 AS 8**	**Milestones:** • Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - multiplication of at least whole 4-digit by 3-digit numbers; - division of at least 4-digit by 1-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including: - multiplying in columns; - long division. • Recognise, describe and use divisibility rule for 2 and 5. • Locate positions on a coded grid, describe how to move between positions on a grid, and recognize maps as grids.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Multiplication in columns	Multiplication: 4-digit by 3-digit numbers	Long division	Long division: 4-digit number by a 1-digit number	Grid locations
Resources:	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets

WEEK 6: DAY 1

Notes to the teacher:

- The focus of the next two lessons is on multiplication in columns.
- The work continues from Term 3 Week 6 and the same approach is used here.
- In this lesson and the following lesson, the work is now extended to multiplying three-digit by four-digit numbers.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity

Let learners copy and complete the multiplication tables below. Afterwards, they can swop books and mark each other's work. Ask them what they notice about the number of 0s each time.

	1	2	3	4	5	6	7	8	9	10
100										
200										
300										
400										
500										
600										
700										
800										
900										

	10	20	30	40	50	60	70	80	90	100
100										
200										
300										
400										
500										
600										
700										
800										
900										

	100	200	300	400	500	600	700	800	900	1000
100										
200										
300										
400										
500										
600										
700										
800										
900										

Concept Development

Write this question on the board: *38 aeroplanes were chartered to bring European football supporters to the World Cup Soccer in South Africa. Each plane can carry 345 passengers.*
Ask learners to write both numbers in expanded notation, and then to use the tables (if they need them), to find out how many people in total can be carried by the 38 aeroplanes.
Learners may do it like this:

	8 × 5 = 40
For 8 aeroplanes:	8 × 40 = 320
	8 × 300 = 2400
For 30 aeroplanes	30 × 5 = 150
	30 × 40 = 1200
	30 × 300 =9000

Learners may then add up all the numbers on the right, and write the answer at the bottom.
Give several problems that learners may do in the same way, involving 2 digit by 3 digit numbers, as well as 3 digit by 3 digit numbers, for example: *Green Point Football Stadium is divided into 124 stands. Each stand can seat 544 people. How many people can be seated in total?*

When learners have done two of these problems, suggest that they write the two numbers at the top as shown here before they start working (you may wish to use a different problem to demonstrate this way of writing).
When they have done two more problems, suggest that they do not write the sentences 8 × 5 = etcetera on the left down, to enable them to work faster.

	345
	x38
8 × 5 =	40
8 × 40 =	320
8 × 300 =	2400
30 × 5 =	150
30 × 40 =	1200
30 × 300 =	9000
	13110

Let them do more similar problems.
Encourage learners to stop consulting the tables.
Once they become experienced, you may challenge them to do some of the addition work mentally as shown here. However, do not force learners to do this: allow those who need to write the numbers down separately to do so if they wish.

	345
	x38
8 × 5 =	40
8 × 40 =	320
8 × 300 =	2400
30 × 5 =	150
30 × 40 =	1200
30 × 300 =	9000
	13110

Consolidation

- Learners can do three multiplication calculations: a 3-digit by a 2-digit number, a 4-digit by a 2-digit number, a 3-digit by a 3-digit number

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and their written work whether they are grasping the concept of multiplying up to 4-digit by 2-digit and 3-digit by 3-digit numbers in columns.

WEEK 6: DAY 2

Notes to the teacher:

- Today we will continue from the previous lesson, multiplying in columns, with the focus on multiplying a 4-digit number by a 3-digit number.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

Let learners copy and complete the multiplication tables below. Afterwards, they can swop books and mark each other's work. Ask them what they notice about the number of 0s each time.

	1	2	3	4	5	6	7	8	9	10
1000										
2000										
3000										
4000										
5000										
6000										
7000										
8000										
9000										

	10	20	30	40	50	60	70	80	90	100
1000										
2000										
3000										
4000										
5000										
6000										
7000										
8000										
9000										

	100	200	300	400	500	600	700	800	900	1000
1000										
2000										
3000										
4000										
5000										
6000										
7000										
8000										
9000										

Concept Development

Let learners do multiplication problems involving four-digit numbers like those given below. Say to learners that they may consult their tables if necessary, but they should try to gradually become able to do without the tables.

1 242 buses were hired to transport Bafana Bafana fans from different parts of KwaZulu Natal to Durban to watch their team play in the World Cup. Each bus could transport 64 passengers. How many fans were transported to Durban?

On the chicken farm, 2 562 eggs are laid every day of the year. How many eggs are laid in a year?

Allow learners who need to write it detailed to do so, as shown in the previous lesson plan. Also encourage learners to try to manage with as little writing as possible.

Consolidation (15 minutes)

- If there are no suitable exercises in the textbook, make a worksheet or write work on the board to give the learners practice in multiplying 4-digit numbers by 3-digit numbers. Include multiplication of some smaller numbers as well. If there are any learners still not grasping this concept properly, work with them individually or in small groups.

ASSESSMENT	**Informal:** Assess from the learners' participation in class and their written work whether they can multiply a 4-digit by a 3-digit number.

WEEK 6: DAY 3

Notes to the teacher:

- In the third term, learners were introduced to the concept of long division and divided 2-digit numbers by 1-digit numbers.
- In today's lesson, we will continue with long division, extending this to dividing a 3-digit by a 1-digit number and progressing, in the next lesson, to dividing a 4-digit number by a 1-digit number using long division.
- Division is the inverse of multiplication. Therefore, learners can check each division calculation by doing multiplication. In this way, they not only check their answers but get more practice in multiplication.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Ask questions like the following, and suggest to learners that they look up the answers in the multiplication tables they have completed on the previous two days.

How many tins of juice at R6 each can you buy with R3000?

How many tins of juice at R4 each can you buy with R6000?

How many packets of sweets at R3 each can you buy with R9000?

R8000 must be equally shared between 4 people. How much money will each person get?

R6000 must be equally shared between 5 people. How much money will each person get?

Concept Development and problem solving

Give learners the following problem to work at:

How many packets of sweets at R3 each can you buy with R4800?

Suggest to learners that they start by making an estimate which will not use up all the available money, for example 100 packet of sweets.

They may write this as follows:

100 packets of sweets at R3 each will cost	R300

Ask them to now add more sweets, still without using up all the money. If necessary, you may suggest that they buy another 200 sweets:

200 packets of sweets at R3 each will cost	R600

Ask them to now add up how many sweets they have bought, and how much it costs in total. Their writing may then look like this:

100 packets of sweets at R3 each will cost	R300
200 packets of sweets at R3 each will cost	R600
	R900

Ask learners to continue like this until they have used up all the money, or less than R3 remains. Their written work may look as shown (although different learners may have different numbers).

100 packets of sweets at R3 each will cost	R300
200 packets of sweets at R3 each will cost	R600
	R900
1000 packets of sweets at R3 each will cost	R3000
	R3900
200 packets of sweets at R3 each will cost	R600
	R4500
100 packets of sweets at R3 each will cost	R300
	R4800

Ask learners to now find out how many packets of sweets they have bought in total. Allow them to establish for themselves that they may do so by adding up the numbers on the left.

Give another similar problem, for example:
How many tins of juice at R6 each can you buy with R7300?
Ask them to do this in the same way as the previous problem. Suggest that they do not write the full sentences on the left but just the numbers. their work may look like this (but different learners may have different numbers):

Number of tins	Money
200	1200
200	1200
	2400
300	1800
	4200
300	1800
	6000
200	1200
	7200
10	60
	7260
5	30
	7290
1	6
	7296

Learners may add up the numbers on the left to find the answer, and may subtract the final total on the right from R7300 to find out how much money remains.
Give learners several more similar problems to do in the same way.
Once they get experienced, encourage them to be bold and to start with larger steps at the beginning.
Note that this is long division, although it is written up in a different way than we used to do traditionally.

WEEK 6: DAY 4

Notes to the teacher:

- In this lesson learners will solve equal sharing problems by doing long division.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Concept development

Give learners the following problem to work on:

5500 eggs are to be equally shared between 8 chicken farmers. How many will each farmer get?

Suggest that they first share out a small number of eggs to each person, to get started, for example 100 eggs.

Then they may share out more eggs in steps, until there are not enough eggs left to share equally.

Also ask them to write up their work like they did on the previous day.

Their work may look as follows

Number of eggs for each farmer	Total number of eggs shared out
200	1600
200	1600
	3200
100	800
	4000
50	400
	4400
10	80
	4480
2	16
562	4496

4 eggs remain, which cannot be shared.

Problem Solving (15 minutes)

- If there are no suitable problems in the textbook, make a worksheet or write problems on the board which entail dividing a 4-digit number by a 1-digit number.
- Encourage learners to try to do the problems in as few steps as possible, starting with larger steps.
- They need not fear of taking too big a first step, because they can cross it out and start again.
- Once learners get more fluent, you may include problems which require division by a two-digit number.

ASSESSMENT	**Informal:** The learners' completed class work will enable you to assess whether they can use long division to divide a 4-digit number by a 1-digit number.

WEEK 6: DAY 5

Notes to the teacher:

- To give the learners a break from number work, we will focus on locating positions on a coded grid and tracing a path between positions from instructions.
- This integrates with Social Sciences (Geography) and is an important part of map reading. The world is divided into grids by imaginary lines of latitude (horizontal lines parallel to the equator) and lines of longitude (vertical lines from the North Pole to the South Pole). Each place on earth has its own co-ordinates (N/S and W/E) which tell us its unique position. Learners need to be able to recognise a map as a grid.
- Positions on a grid are located by reading it co-ordinates, usually on the vertical axis and then the horizontal axis. Each axis is numbered or lettered.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

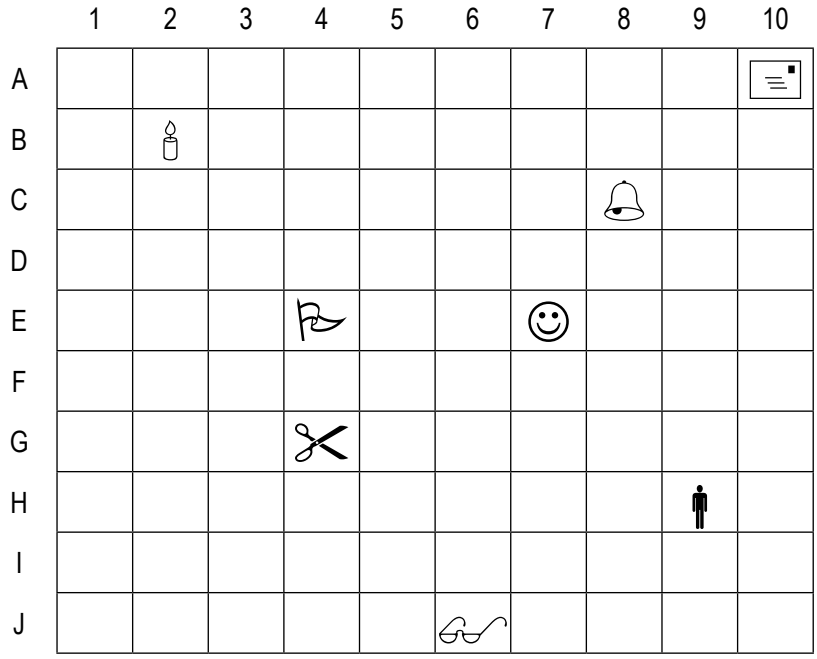
Oral and Mental Activity (10 minutes)

- Practise multiplication tables by having a round of "Tables King" or "Tables Challenge" (see Term 2 Addendum Mental Strategies).
- Give the learners 20 multiplication (up to 12x12) and division calculations to do mentally. Read the sums out loud and the learners can write down only the answers. Include multiplication by 0. Afterwards, they can swop books and mark each other's work.

Concept Development (25 minutes)

- If you do not have a globe or world map in your classroom, give the learners a copy of the world map in the *Addendum: World Map for grid locations* to look at.
  - Ask the learners if they can see that the world is divided into small squares, forming a grid. Ask them why they think this has been done. To enable us to find a place's position.
  - Point out how the world is divided into a northern and southern hemisphere by the equator and into a western and eastern hemisphere by the prime meridian.
  - Ask the learners to locate South Africa and say which hemispheres it is in: northern or southern and eastern or western.
  - Discuss anything else of relevance and interest regarding grid location, north south, etc. The learners might be familiar with latitude and longitude from Geography or from Grade 5 mathematics lessons on grid locations.
- Draw a blank grid on the board, using the board ruler or metre stick. Number the columns 1-10 and the rows A-J. Do not draw any pictures on the grid yet (as done in the example below). Learners will take turns to draw different pictures on the grid.
  - Ask a learner to come to the board and show you row E.
  - Choose another learner to come to the board and show you column 7.
  - The first learner must move his finger across the row, while the learner who showed you column 7 must move his finger down the column.
  - Their fingers will meet in a square. Ask anybody if they know the co-ordinates of the square where the two learners' fingers have met: it is E;7 (we normally say the row first, followed by the column, in accordance with world lines of latitude and longitude where latitude is given first).

- The two learners can move away. Choose another learner to come and draw a smiley face in E;7.



Co-ordinates: a set of numbers that together describe the exact position of something

- Give a few learners a turn to come and draw different pictures or symbols in different grid locations, according to the co-ordinates you give them. Examples of pictures and symbols are drawn in the above grid.

• See that the learners know the four cardinal points (north, south, west and east) by asking a learner to draw a compass (similar to the one above) next to the grid on the board. Explain that north usually points to the top of the page (board in this case). Using the four cardinal points, ask learners in turn, several questions such as:
  - How will the man move to his spectacles? (2 blocks south and then 3 blocks west; or 3 blocks west and then 2 blocks south?)
  - How will the scissors get to the letter/envelope? (6 blocks north and then 6 blocks east; or east first and then north?)
  - Start at the flag. Move 2 blocks west and then 4 blocks south. What is the grid location? (I;2)

Consolidation (25 minutes)

• Find an exercise in the textbook to enable learners to practise locating positions on a grid and moving from one position to another on the grid according to instructions. If there are no suitable exercises in the textbook, make a worksheet. Learners can even draw their own grids. You can then write instructions on the board.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses, participation in class and their class work whether they understand locating positions on a grid.

GRADE 6: WEEK 7 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 3 AS 8** **LO 1 AS 7** **LO 2 AS 12** **LO 1 AS 8, 10 (Revision)**	**Milestones:** • Locate positions on a coded grid, describe how to move between positions on a grid and recognize maps as grids. • Solve problems involving comparing two or more quantities of different kinds (rate). • Recognise, describe and use divisibility rule for 2; 5; 10; 100 and 1 000. • Estimate and calculate by selecting and using appropriate operations to solve problems that involve addition and subtraction of mixed numbers; multiplication of 4-digit by 3-digit numbers; division of 4-digit by 1-digit numbers; finding percentages of whole numbers. • Use a range of techniques to perform calculation with whole numbers including adding, subtracting and multiplying in columns; long division.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Grid locations Revise addition and subtraction of mixed numbers	Revise addition, subtraction, multiplication in columns, and long division	Comparing two or more quantities of different kinds: Rate	Comparing two or more quantities of different kinds: Rate	Revise addition, subtraction of mixed numbers and finding a percentage of a whole number
Resources:	Maps with grids (see Addendum), chalkboard, worksheets	Chalkboard, worksheets, textbooks	Chalkboard, worksheets, textbooks	Chalkboard, worksheets, textbooks	Chalkboard, worksheets, textbooks

WEEK 7: DAY 1

Notes to the teacher:

- During this lesson, the learners will use grid locations on maps to find places and will move from one place to another using the cardinal points north, south, west and east.
- The maps and example questions contained in the *Addendum Grid Location Maps* can be used during this lesson if you have no other resources available. However, the learners will need to answer more questions than are in the Addendum. It would also be more meaningful if you could find a map of your own town or area. If necessary, you will have to draw in the grid lines before photocopying it.
- Learners can work in pairs during this lesson. They can even draw their own treasure map on a grid and hide their treasure in a location known only to them, then give their partner directions to follow to find the treasure.
- On a country or town map, they can ask each other questions of their own creation, e.g. learner A asks learner B, "What is the grid location of Mbabane?"
- During every lesson for the rest of this term, time will be spent on revision of previously learnt concepts and on problem solving. Use this time meaningfully to ensure that your learners are competent in all skills and prepared for their final Assessment Task in Week 8. There is very little new work to be done at this stage.

Resources: "Treasure" map and country or town map (see Addendum), chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Investigate divisibility of numbers by 10. Start by doing some counting in 10s (see Addendum Mental Strategies for ideas on how to vary this activity). Examples:
  - Count forwards in 10s from 1 340.
  - Count backwards in 10s from 920.
- Ask the learners what they notice about the numbers they say when they count in 10s: no matter how large the number is, it always ends on a 0. Write 30 random numbers on the board, learners must write down in their workbooks, the numbers that are divisible by 2, 5 and 10 under separate headings. They can also take note of which numbers are divisible by all three numbers:

2 560	3 568	4 545	1 234	48 260	159 756
108 210	7 643	18 456	325 890	444 225	68 260

Work in Pairs (30 minutes)

- Give learners a copy of a "Treasure map" and a map, with grids, of your area (see Addendum Grid Location Maps for examples). They can work in pairs to:
  - Answer questions that you have written on the board (or on a worksheet).
  - Create their own questions and ask their partner to answer them. They can each spend a few minutes writing down questions and then swop with their partner who must write down the answers or they can take turns to orally ask questions.
  - Make their own treasure map in which they hide the treasure and have to guide their partner to finding the treasure by giving him instructions on how to move from a starting point.

Problem Solving (20 minutes)

- Give the learners at least six problems to solve that entail dividing a 4-digit number by a 1-digit number (using long division). For each problem, they must:
  - write a number sentence;
  - do the calculation;
  - check the calculation by multiplying in columns (they must show their working; this gives them additional practice in multiplying in columns, even if they are multiplying by a 1-digit number);
  - write a complete answer.

ASSESSMENT	**Informal:** While the learners are working in pairs, observe what they are doing to enable you to assess whether they can locate positions on a coded grid and describe how to move between positions on a grid.

WEEK 7: DAY 2

Notes to the teacher:

- In today's lesson, we will revise adding and subtracting (up to 9-digit numbers), multiplying (up to 4-digit by 3-digit numbers) in columns and long division.
- Revise each concept by dividing the class into teams, and letting team members do calculations on the board. This will enable you to see which learners are struggling with or have forgotten any of the concepts.
- Give the learners a variety of problems to solve using the different operations and even a combination of operations. A large part of problem solving is identifying which operation/s to use.

Resources: none.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete 20 mental calculations in their workbooks. Write a variety of calculations on the board, including multiplication (up to 12x12), addition and subtraction (using rounding off and compensating), finding fractions of whole numbers and multiple operations entailing using the correct order of operations. The learners can write down the answers only. Afterwards, the learners can swop books and mark each other's work.

Revision (25 minutes)

- Divide the class into five teams and divide the lower part of your chalkboard into five columns to give each team a space for their representative to work in.
  - Write a calculation on the board, e.g. two 6-digit numbers to be added in columns. A learner from each team must come to the board and do the calculation in his/her workspace. Award the first learner finished with the calculation correct, 5 points, the second learner 4 points, third place gets 3 points, fourth place 2 points and the last team gets 1 point.
  - Repeat with as many calculations as necessary to give every learner in each team a turn. If the teams do not have the same number of learners in them, some learner might have to go twice. If you know that a group of learners are weak, give them a slightly easier calculation to do. Include: addition of different size numbers up to 9 digits; subtraction of two numbers up to 9 digits; multiplication in columns up to 4-digit numbers by 3-digit numbers; long division up to a 4-digit number divided by a 1-digit number.
  - When all the learners have had a turn, tally up the totals and give the winning team a reward (e.g. letting them go out to break 5 minutes early).

Problem Solving (25 minutes)

- The learners can solve 10 or more problems entailing the four operations up to the level taught so far. If there are no suitable problems in the textbook, make a worksheet or write problems on the board. Some problems can include two operations, e.g. *the farmer packed oranges that he had picked into crates holding 1 265 oranges each. He filled 352 crates and had 254 oranges left over. How many oranges had he picked?* (This entails multiplying and then adding). For each problem, the learners must follow the steps as in the previous lesson.

WEEK 7: DAY 3

Notes to the teacher:

- In today's lesson, the learners will solve problems entailing comparing quantities of different kinds (rate). All these problems entail multiplication or division: we cannot add or subtract different quantities (e.g. time and money).
- When we compare two different quantities, we use the word "per" or the symbol '/'. For example, a car travels at 100 kilometres per hour; a worker receives R100/day.
- Examples of rate in every day life are wages per hour or day, fuel consumption in a motor car and the time it takes to travel a distance at a certain speed (time, distance, speed calculations). Today's lesson will focus on time, distance and speed calculations. Through doing calculations, the learners can work out the rule or formula. Do not expect them to learn the formula by rote. It is preferable that they work things out. However, a rule or formula might help the weaker learners to solve problems entailing calculating time, distance and speed.
- Flow charts are a useful way to solve problems entailing rate.

Resources: Chalkboard, worksheets, textbook.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Let learners come to the board in turn and write down:
  - The first 5 multiples of 100.
  - Multiples of 100 from 1 500 to 2 200.
  - Multiples of 100 from 37 500 to 36 800.
- Ask the learners what they notice about all the multiples of 100 that were written on the board: they all end with two 0s.
  - Ask them whether numbers that are divisible by 100 will also be divisible by 10? Yes they will, because numbers that are divisible by 10 end in a 0 and those divisible by 100 also end in a 0. However, not all numbers divisible by 10 are divisible by 100. For example, 50 is divisible by 10 because it ends in a 0. However, it is not divisible by 100, as it does not end with two 0s.
  - Write 20 numbers on the board ending with 0 or 00. Learners must copy them and circle those divisible by 10 in blue and those divisible by 100 in red.

Concept Development (25 minutes)

- Explain to the learners that some peoples' hobby is training homing pigeons and racing pigeons (a pigeon is a common bird, like the dove that we see all the time). In many wars fought throughout the ages, pigeons were used as messengers and even saved lives in this way. They would fly with a light piece of paper attached to them in a small container and carry it far away to the recipient. When people race their pigeons, they drive them to another town and, on a given signal, release them from their cages. The first pigeon home is the winner. Write the speeds of the first three groups of birds home in the last race which covered a distance of 240 km:

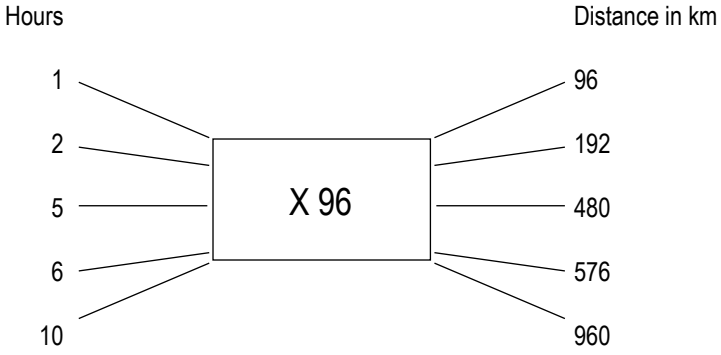
	Time
Group A (gold)	2.5 hours
Group B (silver)	2.75
Group C (bronze)	3 hours

Ask the learners: How do we work out how fast did the first group of birds have to fly to do that distance in 2.5 hours?

Tell them that we measure speed in kilometres per hour, written km/h (write this on the board). We therefore want to calculate how many kilometres the bird flew in 1 hour.

- If nobody can tell you the correct method, give them a clue by saying: the pigeon flew 240 km in 2 hours. How fast did he fly in one hour? This should help the learners see that we must divide the distance by the time he took. Let the learners work it out on their calculators: 240÷2.5=96 km/h.
- Work out Group B's speed: 240÷2.75; the calculator will give you an answer with many decimal places. Use the whole number part only, i.e. 87 km/h.
- Group C flew at 240÷3=80 km/h.

• Tell the learners that we want to calculate how far the pigeons from Group A would fly at the same speed for different numbers of hours: 1 hour, 2 hours, 5 hours, 6 hours and 10 hours. Choose a learner to come and draw a flow chart to work this out (using a calculator where necessary):



- Ask the learners for how many hours the pigeon would have been flying if he had flown 768 km. They can use their calculators to divide 768 by 96 to obtain an answer of 8 hours.
- Ask the learners for their input to help you write the rule or formula for calculating time, distance and speed, from the calculations they have been doing. Write this on the board:
-

Time = Distance÷Speed
Speed = Distance÷Time
Distance = Speed x Time

Do not expect learners to learn these formulae off by heart. Weaker learners can refer to them to help them solve problems.

• Give the learners another problem entailing calculating time, distance or speed, for example, tell them that the world record for the men's 100m sprint, held by Usain Bolt, is 9,69 seconds. If we say that most Olympic athletes run 100 m in 10 seconds, how fast are they running?

- Choose a learner who can tell you the answer: 100 m ÷ 10 = 10 metres per second.

Try to give the learners an idea of how fast this is: 10 metres is about the length of most classrooms and a second is how long it takes to say two words ("One chimpanzee").

Problem Solving (15 minutes)

- If you cannot find problems in the textbook, make a worksheet or write problems on the board to give the learners practice in solving problems which entail time, distance and speed. For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answer;
  - make sure their answer is complete.
- Examples of problems:
  - Speed of a car which travelled a certain distance in a given time.
  - Distance travelled by an animal or person running or walking, given the speed and time.
  - Time it takes to fly an aeroplane, walk, run, drive (a car) when given the distance and speed.

Consolidation (10 minutes)

- Learners can draw and complete a flow diagram to calculate the time it would take to travel different 110 km; 330 km; 660 km and 1 210 km at 110 km/h and to calculate how far they would have travelled at that speed after 7 hours.

ASSESSMENT	**Informal:** Assess from the learners' participation in class and the completed class work whether they understand the concept of comparing two quantities (rate).

WEEK 7: DAY 4

Notes to the teacher:

- Continuing from the previous lesson, today learners will solve more problems entailing rate. There are many problems one can give the learners to solve, for example, on wages per hour/week, price of food per kilogram and the fuel consumption of motor cars.
- We will also use rate to find the "best buy" of different products. Learners will have to bring the products to the same mass or quantity and then calculate the prices for that quantity to decide which the best buy is. It is a similar concept to making equivalent fractions: what we do to the one quantity (multiply or divide), we must do to the other quantity.
- Try to make the problems that the learners must solve as true to life as possible.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" (see Term 2 Addendum Mental Strategies).
- Give the learners 20 random addition and subtraction calculations. Write the calculations on the board and the learners can write down the answers only. Give calculations which will entail rounding off and compensating and regrouping (in addition calculations). Afterwards, the learners can swop books and mark each other's work.

Concept Development (25 minutes)

- Tell the learners that their mothers sent them to the shops with the following list. She told them to buy the most economical (cheapest, best value for money) of each item on the list. She does not mind about the quantity, except for the carrots. Here is the list she gave (write the list on the board):

1 kg carrots Washing powder Full cream milk

You first go to the vegetable section and find the carrots on the shelves like this:

CARROTS:
R4,50 per 500g bunch

- Tell the learners that they were asked to buy 1 kg. How many bunches will they need to buy? 2, because 2x500 g = 1 kg. How much will 1 kg cost? 2x R4,50 = R9,00.
- Ask the learners how much it would cost if they had to buy 1 kg 500 g, and 2 kg. What are they doing each time? They are multiplying the quantity and the price by the same number.
- Now they move on to the washing powder section, but they have a problem. Draw a table on the board similar to the one below depicting different makes and quantities of washing powders and give the learners a few minutes in pairs to try to work out how they will choose the most economical (best value for money). Watch what the learners are doing and when they have finished, let one or two learners who solved the problem come to the board and show their solution.

			
R27,00 per kg	R49,00 per 2 kg	R14,00 per 500 g	R50,00 per 2 kg

All the quantities must be brought to the same, in this case 1 kg. If we multiply or divide the quantities, we must do the same to the prices.

Learners can fill in the prices per 1 kg below each item.

R27,00 per kg	R24,50 per kg	R28,00 per kg	R25,00 per kg

- Ask the learners which is the best value for money. It is the 2 kg pack of "Surf", as it works out to R24,50 per kg.
- Discuss the prices of the other items, noting that the 500 g packet is the least economical. Discuss possible reasons for this (packaging is expensive, for example).
- Repeat with three quantities of milk:

		
R20,00 per 2 litres	R6,20 per 500 ml	R11,00 per 1 litre
R10 per litre	R12,40 per litre	R11,00 per litre

All the quantities must be brought to the same, in this case 1litre. If we multiply or divide the quantities, we must do the same to the prices

- The learners can see that the 2 litre milk is the best value for money.

- Tell the learners that your lawnmower uses a mixture of oil and petrol. For every litre of petrol, you must mix in 100 ml of oil. Ask a learner to come to the board and draw a flow diagram to calculate how much oil you will need if you buy 3 litres, 5 litres and 10 litres of petrol.

The learners should be able to see that when we compare two quantities, we always multiply or divide. We cannot add or subtract different quantities, e.g. litres and Rands.

Problem Solving (15 minutes)

- Give the learners problems to solve which entail rate. Problems can include price per kilogram or litre; the best buy; fuel consumption of a car; wages earned for different hours or days spent working. The learners can solve at least 5 problems individually in their workbooks.

Consolidation (10 minutes)

- Give the learners calculations which they can solve on a flow diagram or by merely calculating the answers, such as:
  - A car travels at 80 km/h. How far will it travel in 2 hours, 4 hours, 8 hours?
  - Potatoes cost R5,95 per kilogram. How much will 5 kg, 10 kg and 12 kg cost?

WEEK 7: DAY 5

Notes to the teacher:

- Today we will revise addition and subtraction of mixed numbers and finding a percentage of a whole number.
- Use this time to assess who is struggling or has forgotten any of these concepts and remediate any problems.
- Keep the learners actively involved by letting them do different parts of each calculation on the board and by asking questions. If you found that the competition between teams in a previous lesson worked well, then have another competition. Either the teams who did not win can challenge the winning team, or you can make new teams.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Let the learners count in 1 000s. See Addendum Mental Strategies for ideas on how to vary this activity. Examples:
  - Count in 1 000s from 123 000 to 131 000.
  - Count backwards in 1 000s from 89 000.
  - Ask the learners what they notice about the numbers that are divisible by a 1 000: they all end in three 0s.
- Write 30 random numbers on the board. The learners can draw 5 columns in their books and write headings: 'divisible by:' '2'; '5'; '10'; '100'; '1 000' at the top of each column. They must then write the numbers which you wrote on the board in the correct column. They will notice that all the numbers that are divisible by 1 000 are divisible by 2, 5, 10 and 100.

Revision (20 minutes)

- Write a problem on the board that entails addition of two mixed numbers. Choose learners in turn to come to the board and complete each step of the calculation, adding to their explanation, if necessary
  - Repeat with a problem that entails adding three mixed numbers.
  - Now write a problem that entails subtraction of mixed numbers, choosing different learners to complete each step.
  - Give the learners a problem to solve that entails addition and subtraction together, e.g.

    $4\frac{1}{4} - 2\frac{3}{8} + 5\frac{7}{16}$. Let the learners do this calculation in pairs. Walk around and see that they are managing and rectify any errors you see occurring.
- Revise the concept of percentage with the learners. Ask them what percent means. Draw a table on the board and choose learners in turn to come and fill in each missing percentage:

Common Fraction	Percent	Common Fraction	Percent	Common Fraction	Percent
$\frac{1}{2}$		$\frac{1}{5}$		$\frac{1}{10}$	
$\frac{1}{4}$		$\frac{2}{5}$		$\frac{1}{10}$	
$\frac{3}{4}$		$\frac{3}{5}$		$\frac{3}{10}$	

To change a common fraction to a percentage, make an equivalent fraction with denominator 100.

- In pairs, learners can solve the following problem: *25% of 120 rugby players were selected for the overseas tour. How many rugby players went on tour?* Afterwards discuss each step: change the percent to a common fraction, divide by the denominator and multiply by the numerator. 25% of 120 is 30 so 30 players went on tour.
- Repeat with another similar problem.

Problem Solving (30 minutes)

- Work with any learners that you have identified who are having difficulty with any of these concepts while the rest of the learners solve problems that entail addition and subtraction of mixed numbers and finding a percentage of a whole number. The learners should be able to complete at least 10 to 15 problems. If there are no suitable revision exercises in the textbook, make a worksheet or write problems on the board. For each problem, the learners must:
  - write a number sentence;
  - do the calculation;
  - check their answer;
  - make sure they write a complete answer.

ASSESSMENT	**Informal:** This revision lesson will enable you to identify any learners who are still not sure of these concepts and assist them in becoming competent.

GRADE 6: WEEK 8 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 4 AS 8, 10**	**Milestones:** • Investigate and approximate volume/capacity of objects (by packing or filling them) in order to develop rules for volume of rectangular prisms. • Investigate relationships between surface area, volume and dimensions of rectangular prisms. • Revision of all concepts.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.					
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Mental calculations Assessment Task Revision and problems solving	Mental calculations Assessment Task Surface area	Mental calculations Assessment Task Volume	Mental calculations Assessment Task Volume	Assessment task
Resources:	Prepared Mental Assessment Task Chalkboard, textbook, worksheets	Prepared Mental Assessment Task Chalkboard, textbook, worksheets. Nets of cube and rectangular prism	Prepared Mental Assessment Task Chalkboard, textbooks, worksheets, cubic centimetre nets, sticky tape or glue, scrap paper or thin cardboard, scissors	Prepared Mental Assessment Task Chalkboard, textbook, worksheets, cubic centimetres from the previous lesson, different small boxes (matches, toothpicks, cough lozenges, etc)	Prepared Assessment Task

WEEK 8: DAY 1

Notes to the teacher:

- The learners will spend today's lesson solving problems that entail addition, subtraction, multiplication and division (to the levels required by the Assessment Standards), addition and subtraction of mixed numbers, rate, and finding percentages of whole numbers.
- While they are busy, walk around and help individuals or work with small groups of learners at the board who you see are having difficulty with any aspect of today's work.
- Some new work (which does not need to be formally assessed) will be done this week, but any spare time during any lessons must be spent on revision in preparation for the final Assessment Task of Grade 6 on Day 5.
- Every day, a different Assessment Task must be given to assess learners' abilities to do mental calculations.

Resources: Chalkboard, textbook, worksheets, Prepared Assessment Task (multiplication up to 12x12).

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete an Assessment Task to assess their ability to do mental calculations that entail multiplication (up to 12x12). Suggestions for this task are:
  - Say 10 multiplications to which the learners must write down the answers only.
  - Write 10 multiplications on the board. Learners must write down the answers only.

Problem Solving (30 minutes)

- Make this a meaningful revision lesson by finding a revision exercise in the textbook, making a worksheet or writing problems on the board. The learners must work in their workbooks to solve problems, following all the necessary steps with which they are now familiar, that entail:
  - Addition and subtraction of fractions and mixed numbers.
  - Multiplication of at least 4-digit by 3-digit numbers.
  - Division of at least 4-digit by 1-digit numbers.
  - Finding percentages of whole numbers.
  - Rate (comparing two quantities).
  - Order of operations.

While the learners are busy, work with individual learners or groups of learners who are not competent in any of these concepts.

Consolidation (20 minutes)

- If you cannot find a suitable revision exercise in the textbook, make worksheet or write calculations on the board which entail:
  - adding, subtracting and multiplying in columns;
  - long division;
  - recognising place value in 9-digit numbers and in decimal fractions up to 2 decimal places.

ASSESSMENT	**Informal:** if you notice any general areas of weakness during this revision lesson, find time during the coming days to spend time on that area to ensure that your learners are competent in all concepts to be assessed this week.
ASSESSMENT	**Formal, recorded Assessment Task 2:** • LO 1 AS 9: perform mental calculations involving multiplicatoin of whole numbers to at least 12x12.

WEEK 8: DAY 2

Notes to the teacher:

- Earlier in the term, learners calculated the perimeter and area of squares and rectangles, and investigated the relationship between the perimeter and area of these shapes.
- In today's lesson, the learners will calculate the surface area of cubes and rectangular prisms. These objects both have 6 faces. Each face has an area. The surface area of a cube is obtained by multiplying the surface area of one face by 6. A rectangular prism has four rectangular faces and two different sized square or rectangular faces. The surface area is found by multiplying the area of the four equal sized faces by four, the other two equal sized faces by 2 and adding the two totals together.
- This lesson will be practical in that learners will be given a net of a cube and a net of a rectangular prism. They will calculate the area of each net (excluding the glue flaps) before using the net to make a 3-d object. They will then calculate the surface area of the 3-d object and find it is the same as the net.

Resources: Chalkboard, textbook, nets of cubes and rectangular prisms (see Addendum: Nets), Prepared Assessment Task.

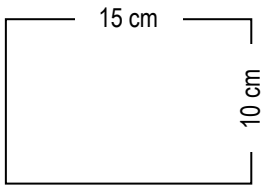
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write 20 addition and subtraction calculations on the board to formally assess the learners' ability to do these calculations.

Concept Development (30 minutes)

- Draw a rectangle on the board and fill in dimensions for its length and breadth:



  - Tell the learners to work in pairs and calculate the perimeter and area of the rectangle and raise their hands as soon as they are finished.
  - Ask the first learners to raise their hands to tell you what they obtained for the perimeter, and how they obtained it: (15+10) x 2 = 50 cm.
  - Ask the second pair of learners to raise their hands to tell you what they obtained for the area and how they calculated it: 15x10=150 cm^2.
  - If any pairs of learners have forgotten how to calculate perimeter and area, make sure that they remember now. If necessary, do another example step-by-step on the board.
  - Repeat by drawing a square on the board and asking learners to calculate its perimeter and area in pairs.
- Give each learner a net of a cube, and a net of a rectangular prism. They must not cut it out at this stage.
  - Tell them that they must use their knowledge of calculating area to calculate the complete area of the net of the square. This will entail accurate measurement. If the sides of each square are not exact centimetres, the learners can use their calculators but must write down what they entered in the calculator.
  - Ask a few learners in turn what they found the area of the net to be and how they calculated it. They will have measured the side of one square, multiplied that number by itself to obtain the area of one square and then multiplied that by 6 to obtain the total area.

- Repeat with the area of the net of the rectangular prism. This time, the learners will find the area of one rectangle and multiply it by 4. They will find the area of one square and multiply it by 2. They will then add those two totals together to find the total area of the net of the rectangular prism.

• The learners can now build their cubes and rectangular prisms.
  - Ask the learners how many faces the cube has. It has 6.
  - Ask the learners what they understand by the word *surface* and explain it by giving examples (the part of the desk that they write on).
  - Explain to the learners that the cube has a *surface area*. Can anybody perhaps think what we mean by surface area?
  - Ask the learners if they can tell you what the surface area of the cube is? It will be the same as the area of the net of the cube.
  - Pose this question: If you were to calculate the surface area of a cube, without first calculating the area of its net, how would you do it? Find the area of one of its faces, and multiply by 6.
  - Repeat the above with the rectangular prism.

The Encarta Dictionary defines **surface** as the outermost or uppermost part of a thing, the one that is usually presented to the outside world and can be seen and touched.

Consolidation (20 minutes)

• Find an exercise in the textbook to give the learners practice in calculating the surface area of cubes and rectangular prisms. If there are no suitable exercises, make a worksheet, or draw 3 cubes and 3 rectangular prisms on the board, filling in the necessary measurements to enable the learners to calculate the surface area of the objects.

• If there is any time, give the learners some revision work to do on any concepts they need to know for their final Assessment Task.

ASSESSMENT	**Informal:** From the learners' participation in class and their written work, you will be able to assess whether they understand the concept of surface area and how to calculate the surface area of cubes and rectangular prisms.
ASSESSMENT	**Formal, recorded Assessment Task 2:** • LO 1 AS 9: Perform mental calculations involving addition and subtraction.

WEEK 8: DAY 3

Notes to the teacher:

- The learners should now understand the concepts of perimeter (which has one dimension, i.e. length) and area (which has two dimensions) and surface area of a cube or rectangular prism. Today, they will be introduced to volume, the amount of space a 3-d object occupies.
- Anything which has 3 dimensions – a book, a box, a fridge, a person – occupies space. This is called its volume. We measure volume in cubic units: cm^3 (cubic centimetres) and m^3 (cubic metres).
- In today's lesson, the learners will spend time making cubic centimetres. This is intricate and quite tricky and entails accurate measurement. Do not be too concerned if the cubes are not as solid as they could be; they will still serve their purpose, in the next lesson, to fill containers to develop rules for calculating the volume of rectangular prisms.
- Use time during this lesson to revise any concepts which you feel necessary to revise.

Resources: Chalkboard, textbooks, worksheets, cubic centimetre nets, sticky tape or glue, scrap paper or thin cardboard, scissors.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners an Assessment Task to assess their ability to recognise, describe and use divisibility rules for 2, 5, 10, 100 and 1 000. In previous lessons, the learners have investigated these rules. Use the methods in those lessons to create a meaningful Assessment Task.

Concept Development (20 minutes)

- Refer to the Addendum Nets and draw the net of a cube on the board. Tell the learners that you are giving them 15 minutes to make as many cubes as they can, in groups or in pairs, on the scrap paper or thin cardboard you have given them. The winning group or pair will get a reward. Each side of the square must measure 1 cm. Explain that they must copy the net you have drawn. While they are busy, help any groups who are having difficulty. They must keep the cubes in a safe place for the next lesson.

Problem Solving (15 minutes)

- Give the learners problems to solve to practise any areas of weakness that you have noticed. If the learners seem competent in all concepts, give them a variety of problems to solve to practise concepts required for their final Assessment Task. These concepts include:
  - Addition and subtraction of fractions and mixed numbers: assess this formally.
  - Multiplication of at least 4-digit by 3-digit numbers.
  - Division of at least 4-digit by 1-digit numbers.
  - Finding percentages of whole numbers.
  - Rate (comparing two quantities).
  - Order of operations.

Any learners who are having difficulty with any of these concepts will require your special attention and assistance during this time.

Consolidation (15 minutes)

- Revise any concepts that need revision, including:
  - Locating positions on a grid.
  - Predicting likelihood of events in daily life on a scale from 'impossible' to 'certain'.
  - Adding, subtracting and multiplying in columns.
  - Long division.
  - Recognising place value in 9-digit numbers and in decimal fractions up to 2 decimal places.

ASSESSMENT	**Formal:** LO 1 AS 8: Addition and subtraction of common fractions with denominators which are multiples of each other and whole numbers with common fractions (mixed numbers) **Informal:** From their written work, assess the learners' ability in all concepts that you have revised today.
ASSESSMENT	**Formal, recorded Assessment Task 2:** • LO 2 AS 12: Recognise, describe and use divisibility rules for 2; 5; 10; 1 000 and 100.

WEEK 8: DAY 4

Notes to the teacher:

- In today's lesson, we will use the cubes that the learners made in the previous lesson to investigate the volume of rectangular prisms. This activity will lead the learners to discover the rule for calculating the volume of rectangular prisms: length x breadth x height.

Resources: Chalkboard, textbook, worksheets, cubic centimetres from the previous lesson, different small boxes (matches, toothpicks, cough lozenges, etc).

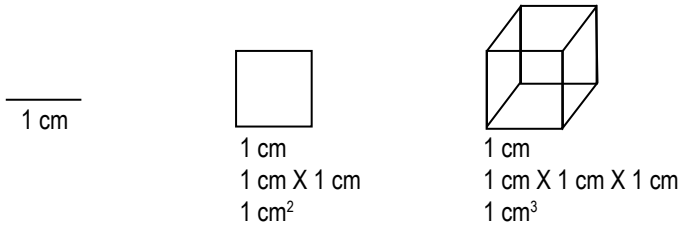
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

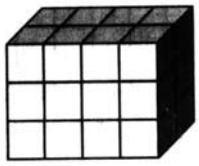
- Give the learners 20 addition and subtraction calculations to assess their ability to perform these mental calculations. Write the calculations on the board. The learners must write down the answers only. Include calculations that entail:
  - regrouping;
  - rounding off and compensating.

Concept Development (20 minutes)

- Draw the following on the board:



  - Tell the learners that they are already familiar with how a centimetre line is drawn, and how the area of a square is calculated. In the previous lesson, the learners made a *cube* which has three dimensions: length, breadth and height. A cube measuring 1 cm by 1 cm by 1 cm, like they made in the previous lesson, is called a *cubic centimetre*, written cm^3. We use it to find the volume of objects.
  - Explain what is meant by volume: all 3-d objects occupy space (give some examples: books, pencil cases, erasers, boxes). The amount of space they occupy is called their volume.
- Give each group of pair of learners a small box, e.g. a matchbox.
  - They must pack the cubes that they made in the previous lesson into the boxes (they might not fit exactly), count the cubes and tell you the approximate volume of the box. A matchbox will fit 5 cubes along its length, 3 along its width and there will only be one layer, i.e. its height will be 1 cm. Therefore, 15 cubes of 1 cm^3, fit in the box. Its volume is 15 cm^3.
  - If you have a variety of different size boxes, let the learners swop boxes and repeat. They will have to share/combine the cubes they made to find the volume of boxes. Each time, encourage the learners to count the number of cubes along the length, breadth and height.
- Tell the learners to build an object consisting of: 4 cubes along its length, 3 cubes along its width and 3 cubes high.



- Ask the learners how many cubes they needed: 36.
- Ask any learners if they can think of a rule or formula to calculate the number of cubic centimetres the object is: multiply Length x Breadth x Height.

Learners are familiar with Length and Breadth from calculating Area.
HEIGHT is the third dimension of a 3-d object.

- Choose two or three learners to come to the board and calculate the surface area of the prism that they have built.
- Repeat by asking the learners to build a rectangular prism containing 5 cubes along its length, 2 along its breadth and 3 blocks high.
- Ask the learners if they can tell you the volume of the prism by using a formula:

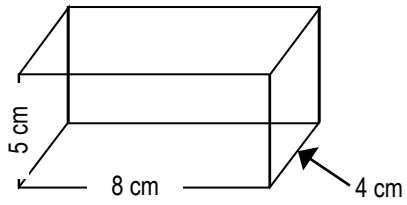
L X B X H
= 5 cm X 2 cm X 3 cm
= 30 cm^3

L = Length
B = Breadth (or W for Width)
H = Height

- Let the learners check by counting the cubes they needed to build the prism.
- Repeat, if necessary, by building another prism.

Consolidation (15 minutes)

- Give the learners practice in calculating the area of rectangular prisms and cubes. This work can include pictures of blocks, such as above, or drawings where the 3 dimensions are given and the learners calculate the volume and surface area. For example:



Revision (15 minutes)

- Give learners calculations to perform or problems to solve entailing any concepts in which they need practice.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and class work whether they can calculate the volume of rectangular prisms and cubes, and understand the relationship between surface area and volume.
ASSESSMENT	**Formal, recorded Assessment Task 2:** • LO 1 AS 9: Perform mental calculations involving addition and subtraction.

WEEK 8: Day 5

Notes to the teacher:

- In today's lesson, the learners will complete Assessment Task 2 which must consist of all the concepts as stipulated in *The Foundations for Learning, Assessment Framework, Intermediate Phase*. Refer specifically to page 24 of this document.

Resources: Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" or a round of "Tables King" (see Term 2 Addendum, Mental Strategies).

Assessment Task (50 minutes)

- The learners must work individually and in silence to complete the Assessment Task. The requirements are in *The Foundations or Learning, Assessment Framework, Intermediate Phase*, pages 17-18 (Term 4) and on page 24 (Holistic Rubric).

ASSESSMENT	**Formal, recorded Assessment Task 2:** • LO 1 AS 4: Recognise the place value of digits in: - whole numbers to a minimum of 9-digit numbers; - decimal fractions to at least 2 decimal places. • LO 1 AS 7: Solve problems involving comparing two or more quantities of different kinds (rate). • LO 1 AS 8: Estimate and calculate by selecting and using appropriate operations to solve problems that involve: - Multiplication of at least whole 4-digit numbers by 3-digit numbers. - Division of at least 4-digit by 1-digit numbers. - Finding percentages of whole numbers. - Multiple operations of whole numbers with or without brackets. • LO 1 AS 10: Use a range of techniques to perform written and mental calculations with whole numbers including: - Addition and subtraction of 9-digit numbers using columns. - Multiplication of 4-digit by 3-digit numbers using columns. - Long division. • LO 3 AS 8: Locate positions on a coded grid, describe how to move between positions on a grid and recognize maps as grids. • LO 5 AS 8: Predict the likelihood of events in daily life based on observation, and place them on a scale from 'impossible' to 'certain'.

GRADE 6: WEEK 9 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 3 AS 8** **LO 3 AS 6** **LO 2 Geometric patterns** **LO 4 Measurement**	**Milestones:** • Locate positions on a coded grid. • Recognise and describe natural and cultural 2-dimensional shapes, 3-dimensional objects and patterns in terms of geometric properties.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.					
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Grid Locations: Battleships	Measurement: Gingerbread House	Measurement: Gingerbread House	Measurement: Gingerbread House	Revision of Mathematical facts: Maths Chain game
Resources:	Chalkboard, grids for learners (See Addendum Battleships)	Chalkboard, cardboard, rulers, scissors, glue, crayons	Chalkboard, cardboard, rulers, scissors, glue, crayons	Chalkboard, cardboard, rulers, scissors, glue, crayons	See Addendum Maths Chain game

WEEK 9: DAY 1

Notes to the teacher:

- If for any reason you did not manage to finish Assessment Task 2 in the previous lesson, complete it during this lesson. However, by now all formal assessments for the year should be complete.
- It is important not to lose momentum during the next two weeks. Each lesson will comprise a meaningful but fun activity (building out of cardboard, revision quizzes and games) and conclude with the learners doing problem solving or revision calculations in their workbooks.
- Various activities are contained in different Addendums to these lesson plans and will be referred to in the lesson plan notes.
- Today the learners will play Battleships to revise grid locations.

Resources: Battleships grids (see Addendum Battleships), chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete the following magic squares. The total in each row, column and diagonal is the same. The total is obtained by adding the numbers in the completed row, column or diagonal.

132	78		48
	42	126	84
66		60	102
54		72	114

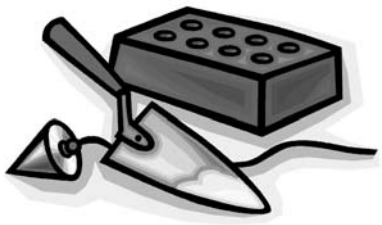
	102		36
48	84		54
108			90
	42	60	120

Concept Development (30 minutes)

- The learners can play “Battleships” in pairs. See Addendum Battleships for instructions. Sometimes learners are confused at first. Make sure that they fully understand the rules of the game, especially which grid to mark and how to mark it, by explaining with examples before they begin and by walking around while they are playing to ensure they are playing properly.

Consolidation (20 minutes)

- Make a worksheet or draw a table such as the following on the board for the learners to copy and complete. Draw as many natural or cultural 2-dimensional shapes, 3-dimensional objects and patterns for learners to describe in terms of geometric properties.

Natural or cultural 2-d shape, 3-d object or pattern	Names of Geometric shapes and/or objects that can see	Number of sides in each shape	Number of faces in each object	Number of right angles in each shape or object
 Bee hive				
				
				
				
				
				

ASSESSMENT	**Informal:** Assess from the learners' completed work whether they can recognise and describe natural and cultural 2-dimensional shapes, 3-dimensional objects and patterns in terms of geometric properties.

WEEK 9: DAY 2

Notes to the teacher:

- In today's lesson, the learners will commence construction of a cardboard "gingerbread house." In many northern hemisphere countries, gingerbread houses are made at Christmas time. They are made out of backed gingerbread, which has been cut into the necessary shapes before baking and then put together with icing. Children often participate by decorating the roof and walls with sweets, biscuits, etc.
- Building a cardboard house entails accurate measuring and cutting skills, planning where to put glue flaps and designing patterns with which to decorate their houses.
- In today's lesson, the learners will accurately draw the necessary shapes, cut out and decorate the roofs using tessellations.

Resources: Dimensions for gingerbread house (See Addendum Gabled Gingerbread house), cardboard (e.g. old cereal boxes, the coloured side of the boxes face inwards so that the outside is plain and can be decorated), rulers, scissors, glue.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round or two of "Tables King" or "Tables Challenge" (see Addendum Mental Strategies).

Concept Development (10 minutes)

- Discuss different traditions that we have when we celebrate different festivals, e.g. Christmas, or Eid, depending on what is familiar to your learners. Explain to the learners that in certain countries in the northern hemisphere, it is traditional at Christmas time to bake gingerbread houses. Dough is made and templates cut out of the dough before it is baked. When it has been baked, the parts of the house are assembled using icing. The house is decorated with sweets and biscuits, often by the children. Tell the learners that they are going to make a cardboard gingerbread house.
- Copy the Addendum Gabled gingerbread house for each pair of learners or draw the contents of the Addendum on the board so that learners can see the necessary measurements. Note: the Addendum does *not* contain templates; it contains drawings giving dimensions that are suitable to enable the learners to construct their house.

Practical Activity (30 minutes)

- Learners must very accurately draw the correct number of each shape that is needed.
  - You might have to help them by checking that they have drawn accurate right angles.
  - Do not let them cut anything out until you have checked their measurements (learners in each group can check each other's drawings as well).
  - Also check that the learners have drawn on glue flaps.
- The learners can work on the roofs of their houses.
  - Instruct them to decorate the roof by choosing a geometric shape that will tessellate. They will have to make a template of that shape and then trace around it as many times as necessary to make sure there are no gaps or overlaps on their roofs.
  - They can complete the roof by colouring in the shapes to create a pattern.

Consolidation (10 minutes)

- The learners can answer questions that you have written on the board about the shapes in the gingerbread house. They can write the answers in their books. Examples:
  - How many rectangles/squares can you see?
  - What shape are the windows?
  - Copy a shape that has an angle smaller than and larger than a right angle. Mark the angle larger than a right angle with a red cross and the angle smaller than a right angle with a blue cross.
  - How many lines of symmetry in each window?

ASSESSMENT	**Informal:** Assess the learners' ability to measure accurately.

WEEK 9: DAY 3

Notes to the teacher:
- In today's lesson, the learners will continue building their gingerbread houses.
- They will decorate the walls using a repeated pattern.

Resources: Rulers, pencils, crayons, scissors, glue.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)
- Do some "Running Maths".
- Give the learners ten to fifteen problems to solve mentally. Say the problems and the learners can write down the answers only in their workbooks. Afterwards, they can swop books and mark each other's work. Examples:
  - There are 30 learners in the class. How many fingers and toes are there?
  - My car uses 5 litres of petrol for every 100 km. How much petrol will it use if I drive 300 km?
  - There are 48 apples in a box. $\frac{1}{8}$ of them are bad. How many are bad?

Practical Work (30 minutes)
- The learners can start working on the walls of their houses today. They must not cut out the windows or door; that will be done in the next lesson. Give them specific instructions about decorating the walls and gables to follow. Below are some examples but how they decorate their houses is up to you. Do make sure there are geometric patterns somewhere.
  - Draw a geometric pattern that is 2 cm wide. The bottom of the pattern must be 2 cm from the bottom of the wall. The pattern must continue all the way around the house.

    ⊡▣⊡▣ ◈◈◈◈
  - Draw a frame of 1 cm around each window and the door. Draw a geometric pattern within the frame.
  - Draw patterns on the front and back of the house using tessellations. Draw different patterns on the gabled ends.

Problem Solving (20 minutes)
- The learners can solve problems based on their gingerbread houses, for example:
  - Calculate the surface area of the whole roof of your house. If every cm^2 = 1 m^2 on a real house, how much paint would I need to buy if I can buy it in 1 litre tins and I need 1 litre of paint for every 100 m^2? How much would the paint cost if it is R99 per litre?
  - Calculate the surface area of the front and back of the house. Subtract the surface area of all the windows and doors.

ASSESSMENT	**Informal:** Assess the learners' ability to create a geometric pattern and calculate surface area.

WEEK 9: DAY 4

Notes to the teacher:

- In today's lesson, the learners will complete working on the walls of their houses, and will work on the windows and doors. Once this is all completed, they will assemble their houses.
- If you wish, you can invite a colleague to decide which three houses are the best and award a prize of sorts to the learners who made them.

Resources: Scissors, crayons, glue. Cellophane or tissue paper.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete the following multiplication squares. The answers must be correct along the right sides and along the bottom of each square. The first one is filled in as an example so that you can explain it to the learners:

4	9	**36**
1	9	**9**
4	**81**	

		72
		5
9	**40**	

		48
		28
56	**24**	

		54
		7
6	**63**	

		24
		56
42	**32**	

		88
		18
24	**66**	

Practical Work (40 minutes)

- The learners can complete the walls of their houses today.
- For the windows, the learners can do one of the following (or anything else that you or they think of):
  - Cut the windows out and glue cellophane on the inside of their houses to close the windows. This is quite colourful.
  - Draw window panes and decorations on the window panes so that it looks as if the windows are decorated from the inside (for Christmas).
  - Draw window panes, cut the windows along three sides and fold along the fourth side so that the windows are open.
- The door can be cut out along one side and the top so that it opens. It can be coloured in a bright colour, brown or in patterns.
- When the learners have completed all the decorating of their houses, they can assemble them. They might have to work in pairs to hold the pieces together until the glue has dried.

Problem Solving (10 minutes)

- Learners can use their calculators to solve problems relating to their houses. For example:
  - Calculate the perimeter of the gable end of the house.
  - Calculate the perimeter of the back of the house.

WEEK 9: DAY 5

Notes to the teacher:

- Today the learners can revise basic Maths rules and concepts by playing "The Maths Chain Game". See Addendum of that name for instructions.
- The idea of the game is that the learners have fun while their knowledge is being tested. Do not allow any learners to humiliate each other, because then it is not fun anymore.

Resources: See Addendum Maths Chain Game. Make sure you have enough questions.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise multiplication tables by letting some learners recite parts of different tables, forwards and backwards and then doing "Clock Multiplication" (see Addendum Mental Strategies).

Revision Game (30 minutes)

- Play the Maths Chain Game. All the instructions and resources needed are in the Addendum: Maths Chain Game.

Consolidation (20 minutes)

- Write calculations on the board for learners to complete. Include:
  - Adding and subtracting up to 9-digit numbers in columns.
  - Multiplication of up to 4-digit by 3-digit numbers in columns.
  - Long division.

GRADE 6: WEEK 10 OVERVIEW

Hours: 5	**Number of Periods: 5**
Mathematics **LO 1, 2, 3, 4, 5**	**Milestones:** • General revision of all LO's.

Mental Strategies: Mental strategies are done with the whole class every day. The time should be used to develop skills and to build number sense.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Data Handling: Bar graphs and double bar graphs	Revision: LO 1	Revision: LO 2 and LO 3	Revision: LO 4	General Revision: Maths Chain Game
Resources	Chalkboard	Chalkboard, worksheets	Chalkboard, worksheets	Chalkboard, worksheets	See Addendum

WEEK 10: DAY 1

Notes to the teacher:

- During this, the final week of the year, we will revise the year's work, one LO at a time.
- It is important to keep the learners focussed. They have a long holiday ahead of them, during which time they will forget some of what they have learnt this year. Do not make the holiday even longer by not giving them work to do.
- You can have some fun while revising. Revision can be in the form of daily competitions with the winning group or team obtaining a reward.
- In today's lesson, we will do a data handling task. After obtaining responses to questions, the learners can complete a bar graph and double bar graph to display the information.

Resources: Chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round or two of "Tables King" or "Tables Challenge".

Concept Development (15 minutes)

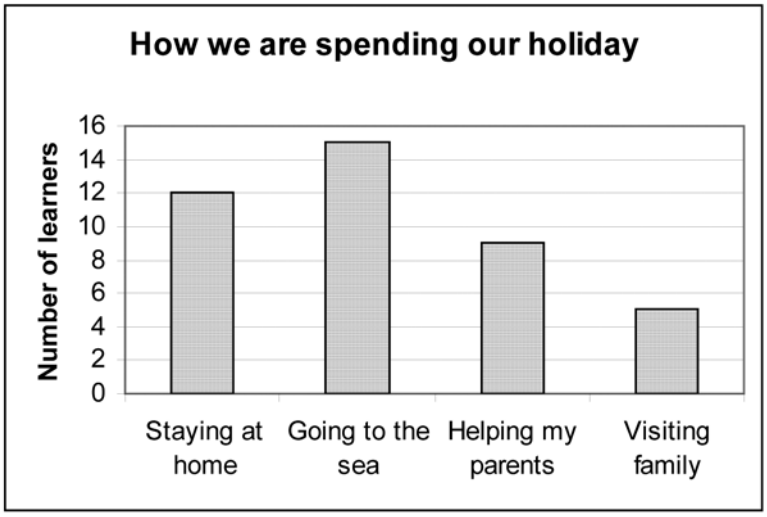
- Ask a few learners to tell you what they are doing in the forthcoming December/January holidays. Depending on your learners' backgrounds, their responses might vary to include:
  - Staying at home.
  - Helping my mother/father with her/his work.
  - Looking after my brothers and sisters.
  - Going away to visit family.
  - Going to the seaside on holiday.
  - Going overseas on holiday.

Choose any subject that is appropriate to your learners. If the majority celebrates Christmas, the subject could be their favourite Christmas food.

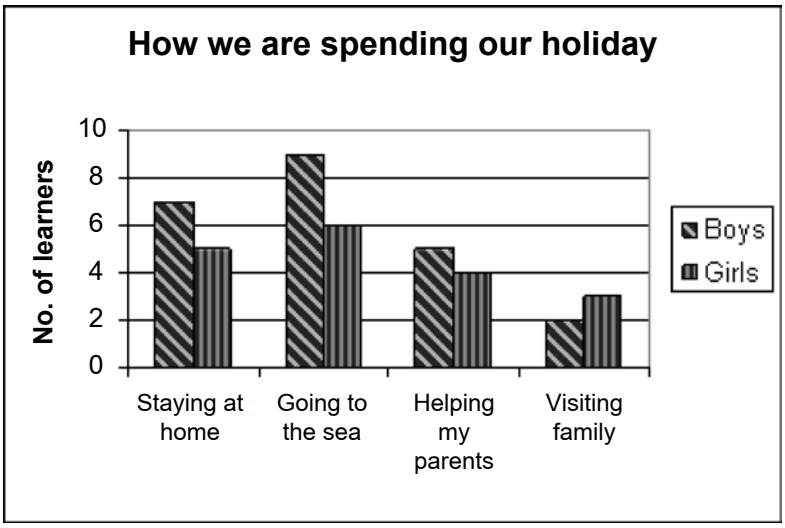
- Depending on their responses, choose four or five suitable categories. Ask a learner to come to the front and count the number of boys and then girls who respond to each of the questions and write the totals on the board. The learners must answer only one question. For example, if they are spending part of their holiday at home and part visiting family, they can choose one.

Consolidation (35 minutes)

- With the help of the learners, draw a neat, properly labelled bar graph and double bar graph on the board to display the information collected. The learners learned how to draw bar graphs in Grade 5. Choose learners in turn to come to the board and draw different parts of the graphs until they are completed (as per the examples below).
- Learners can then copy the graphs into their books or do their own graphs based on different questions posed to the class.
- As it is important to interpret the data, questions can be asked, e.g.
  - How many learners are staying at home?
  - What are most of the learners doing this holiday?
  - How many learners in total were questioned?
  - How many more boys than girls are going to the sea?
  - What are most girls doing this holiday?



This is a bar graph. The total number of learners is shown.
Make sure that the columns (bars) are the same width and the same width apart.
The graph must have a heading and the axes must be labelled.



This is a double bar graph. The number of boys and girls is shown separately.
There must be a key to show which column represents boys and which represents girls.
Make sure that the columns (bars) are the same width and the same width apart.
The graph must have a heading and the axes must be labelled.

WEEK 10: DAY 2

Notes to the teacher:

- Today, we will revise as many concepts from LO 1 as possible.
- Learners enjoy competition and revising in this manner keeps them alert and participating.
- You can do part of the lesson orally and part written. Give the winning team or group a reward.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can complete multiplication squares. The answers must be correct along the right sides and along the bottom of each square. The first one is filled in as an example:

4	9	**36**
1	9	**9**
4	**81**	

		45
		44
36	**55**	

		49
		10
35	**14**	

		56
		110
77	**80**	

		6
		55
11	**30**	

		20
		3
12	**5**	

Revision (30 minutes)

- Divide the learners into 4 teams. Divide the bottom part of your chalkboard into 4 columns to give team members their own workspace.
  - Write a calculation on the board, e.g. addition of two 9-digit numbers. A learner from each team can come to the board and do the calculation. The first person finished with the calculation gets 4 points for his team, the second person gets 3 points, the third person 2 points and the last person 1 point.
  - Repeat with another calculation, entailing a different concept.
  - Keep repeating until all the learners in the class have had at least one turn. Tally up the points and give the winning team a reward.

Problem Solving and Consolidation (20 minutes)

- The learners can complete work in their books to revise any concepts not covered in the competition, either as calculations or by solving problems. By the end of the lesson, the following concepts should have been covered:
  - Addition and subtraction up to 9-digit numbers in columns.
  - Place value of digits in 9-digit numbers and in decimal fractions up to 2 decimal places.
  - Equivalent forms of common fractions, decimal fractions and percentages.
  - Finding a fraction and a percentage of a whole number.
  - Multiple operations with or without brackets.
  - Multiplication in columns (4-digit by 3-digit numbers).
  - Division of up to 4-digit numbers by 1-digit numbers.
  - Long division.
  - Addition and subtraction of decimal fractions up to 2 decimal places.
  - Addition and subtraction of mixed numbers.
  - Ratio and rate.

ASSESSMENT	**Informal:** Any gaps in the learners' knowledge of concepts covered in LO 1 will have been discovered in this lesson.

WEEK 10: DAY 3

Notes to the teacher:

- In today's lesson, the focus will be on revising concepts from LO 2 (Patterns, functions and Algebra) and LO 3 (Space and Shape).
- Keep the learners focussed by varying activities or creating a competition.

Resources: Chalkboard, worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some counting activities (see Addendum Mental Strategies for ideas on how to vary this). Learners can count forwards and backwards in whole numbers and decimals.

Revision (50 minutes)

- However you choose to revise today, orally by means of a competition, by giving the learners written work or by a mixture of both, make sure that as many of the following concepts as possible are included in the revision:
  - Investigating and extending geometric and numeric patterns looking for a rule; representing the rule in tables or flow diagrams.
  - Solve or complete number sentences by inspection or by trail-and-improvement.
  - Properties of 2-d shapes and 3-d objects.
  - Recognising right angles, angles bigger than and smaller than right angles.
  - Enlarging and reducing shapes using square paper.
  - Drawing simple 3-d objects from different perspectives.
  - Describe the movements of translation, reflection and rotations (tessellations).

ASSESSMENT	**Informal:** This lesson should have reassured you that the learners are competent in all work covered in LO 2 and LO 3 this year.

WEEK 10: DAY 4

Notes to the teacher:

- Today we will revise concepts from LO 4, measurement.
- If you want to include actual measuring activities, by all means do so. For example, the learners can measure the length and width of the playground to calculate its perimeter and area.
- Try to do something different from the previous lesson, i.e. if the entire previous lesson was spent doing written work, do oral revision today.

Resources: Chalkboard, worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a times tables speed test to complete. Write 20 random multiplications on the board, keep them covered until all the learners are ready to begin. On your signal, they must start writing the answers only. Stop the learners after 4 minutes, let the learners swop books and mark each other's work. See who obtained the most correct answers.

Revision (50 minutes)

- Using whatever method you feel will keep the learners busy and productive, revise concepts learnt in LO 4: Measurement. A method that you have not perhaps used yet is to give the learners written work to complete in groups. The first group finished with the most correct work can get a reward. Leave enough time to go through the answers with the learners. Concepts to be revised include:
  - Time conversions, calculations, problems, reading analogue and 24-hour time.
  - SI units: problems, conversions, calculations.
  - Perimeter, area, volume.

ASSESSMENT	**Informal:** This revision time will enable you to see whether there are any gaps in the learners' knowledge and understanding of concepts in LO 4.

WEEK 10: DAY 5

Notes to the teacher:

- Spend the final lesson of the year playing the Maths Chain Game (see Addendum) or having a quiz covering all Maths concepts learnt in Grade 6.

Resources: As per the Addendum Maths Chain Game.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

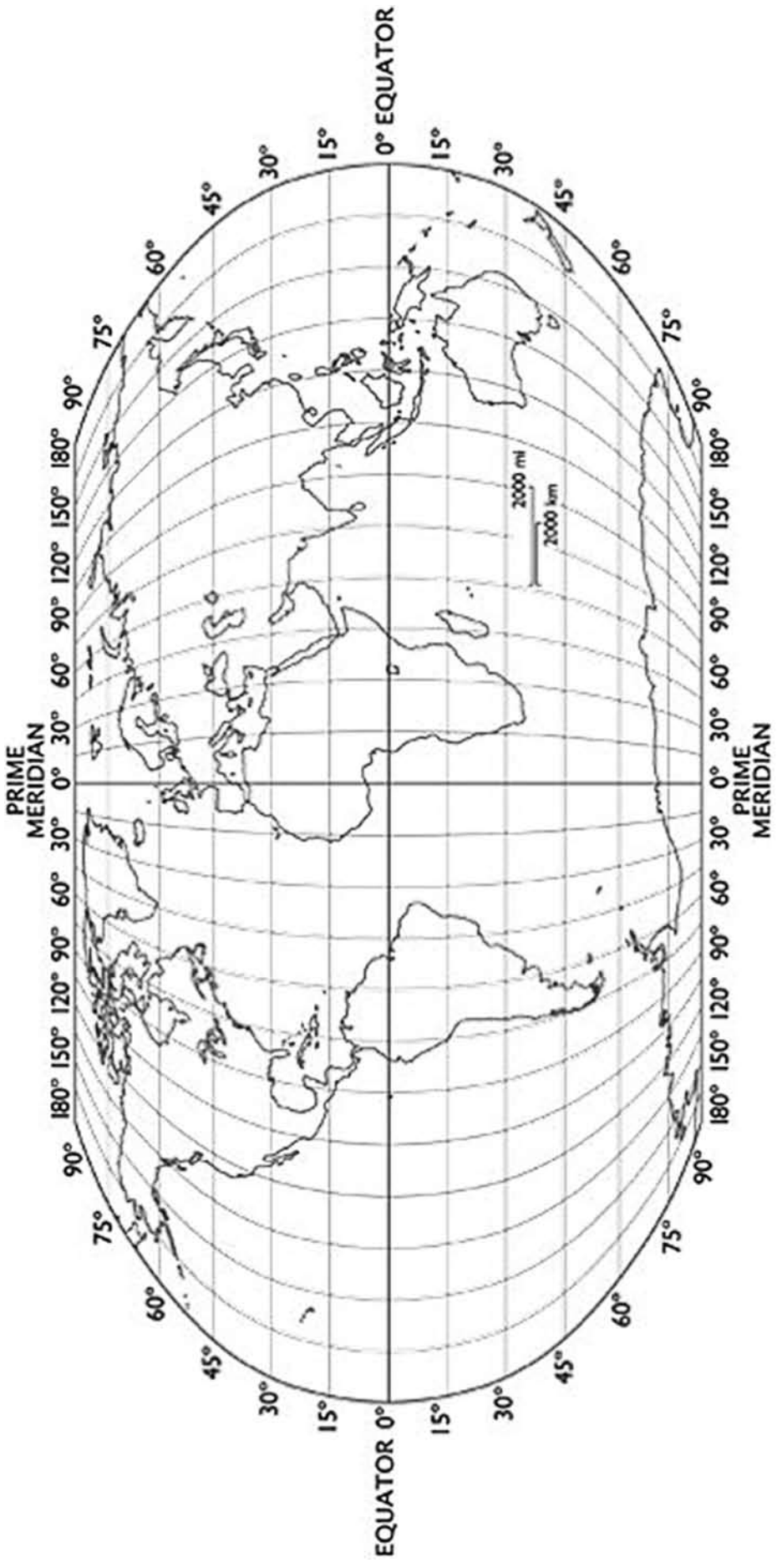
- Do some "Running Maths", a round of "Tables King" and a round of "Tables Challenge" (see Addendum Mental Strategies).

Concept Development (50 minutes)

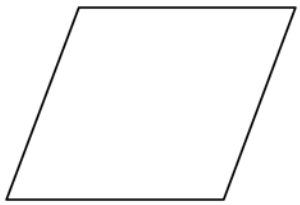
- If the learners enjoyed and benefited from playing the Chain Game (see Addendum), play it again.
  - Choose different contestants, timekeepers and scorers to give different learners a chance to have these roles.
  - You can ask the same questions, but perhaps in reverse order and with slight changes, e.g. instead of asking "How many days in January?" ask, "How many days in March?"

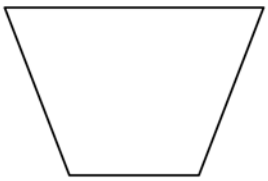
ASSESSMENT	**Informal:** The year has come to an end. Hopefully this final week has consolidated all the Grade 6 work, your learners are all competent in all aspects of the Assessment Standards and can proceed to Grade 7 with sound Mathematical knowledge.

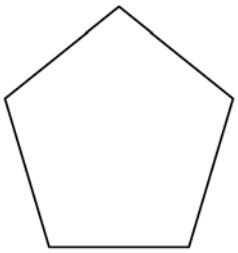
ADDENDUM: WORLD MAP FOR GRID LOCATIONS

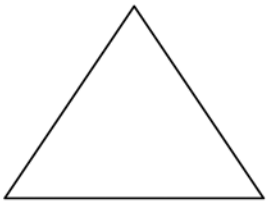


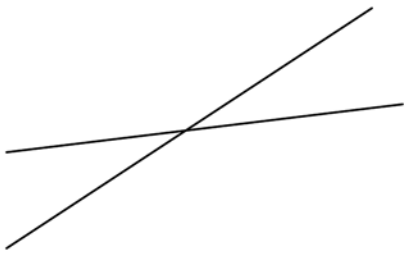
ADDENDUM: SHAPES AND OBJECTS FOR RECOGNISING ANGLES

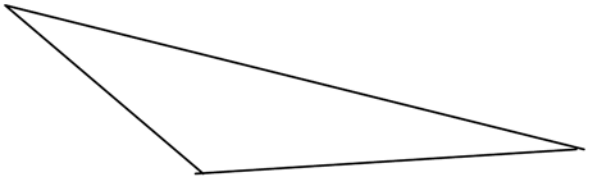




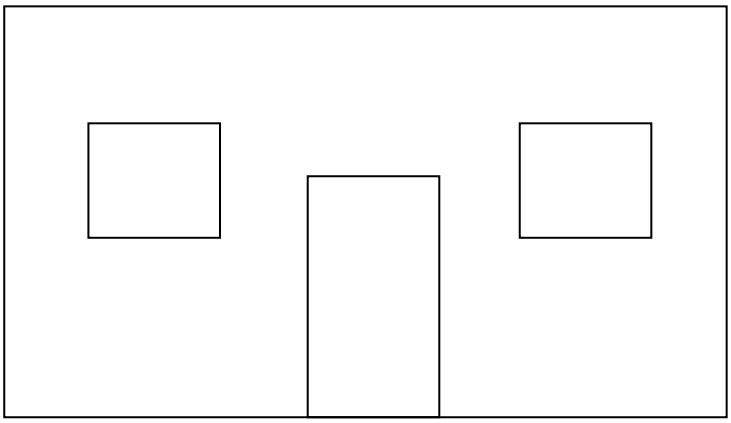




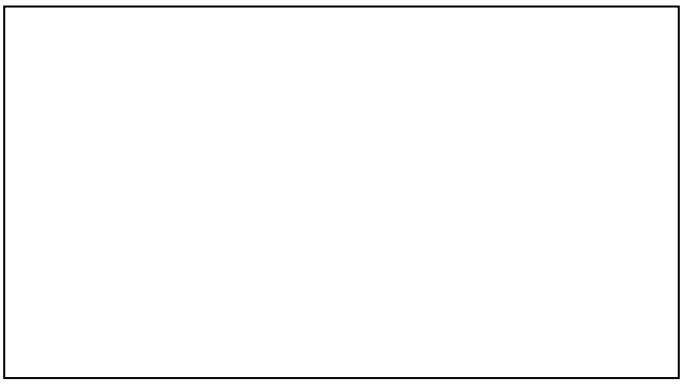




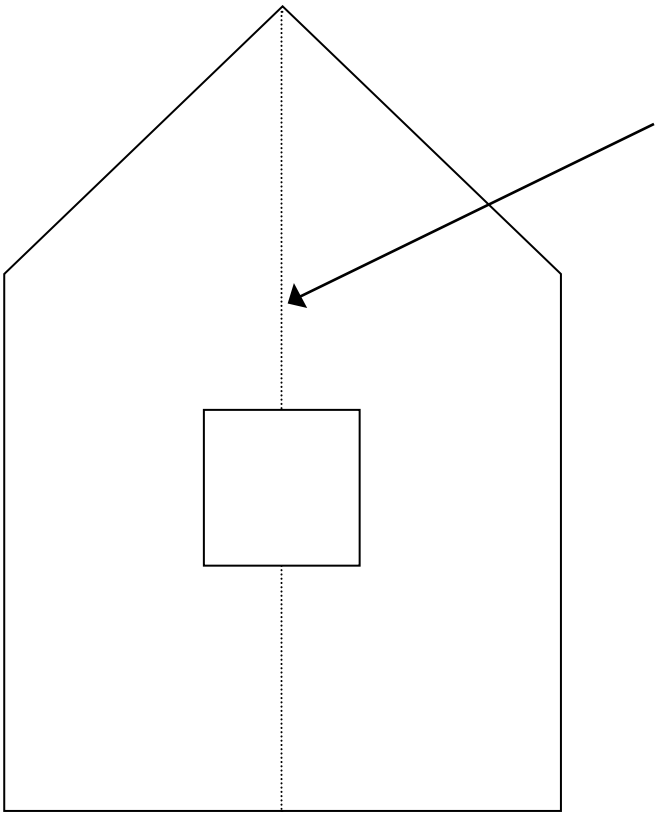
ADDENDUM GABLED "GINGERBREAD HOUSE"



Front and back. Cut 2.
Length 17 cm.
Height 12 cm.
Position windows and doors evenly.
No door at the back.
ADD ON GLUE FLAPS.



Roof. Cut 2.
Length 12 cm.
Width 8,5 cm.
Add on glue flaps where necessary.



18 cm line of symmetry. Fold to find apex of roof.

Gable end: cut 2.
Width 8 cm.
Height (to beginning of roof line) 12 cm.
ADD ON GLUE FLAPS where necessary.
The apex of the roof can be found by folding the gable along its line of symmetry. Mark this line 18 cm from the base of the house.

BATTLESHIPS

This game is for two players. It gives learners good practice in locating positions in a grid.

Preparation:
Each learner needs two coded grids, 8x8 squares is sufficiently large:

My ships

	1	2	3	4	5	6	7	8
A								
B								
C								
D								
E								
F								
G								
H								

My opponent's ships

	1	2	3	4	5	6	7	8
A								
B								
C								
D								
E								
F								
G								
H								

Each learner must place ships within his/her grid ("My ships"), horizontally or vertically and not touching.

1 x Aircraft carrier (6 blocks):

A	A	A	A	A	A

1 x Battleship (4 blocks):

B	B	B	B

2 x Destroyers (3 blocks):

D	D	D

D	D	D

3 x submarines (2 blocks):

S	S

S	S

S	S

My ships

	1	2	3	4	5	6	7	8
A		S	S					D
B					S	S		D
C	A							D
D	A		B	B	B	B		
E	A							
F	A				D			
G	A				D			S
H	A				D			S

My opponent's ships

	1	2	3	4	5	6	7	8
A								
B								
C								
D								
E								
F								
G								
H								

To play:

Learners must not see each other's grids. They take turns to call a grid location to try and hit a ship. A ship is completely sunk when all its blocks have been hit.

Each time the learner has a turn, he must mark off what he called on "My opponent's ships" grid. He can mark a miss with a dot or a cross and a hit with the letter of whatever ship he has hit.

My ships

	1	2	3	4	5	6	7	8
A		S	S					D
B					S	S		D
C	A							D
D	A		B	B	B	B		
E	A							
F	A				D			
G	A				D			S
H	A				D			S

My opponent's ships

	1	2	3	4	5	6	7	8
A								
B		X						
C								
D		D				X		
E				X				
F								
G					S	S		
H								

He must also mark off on his own grid whatever his opponent has called.

My ships

	1	2	3	4	5	6	7	8
A		S	S		X			D
B					~~S~~	S		D
C	A				X			D
D	A		B	B	B	B		
E	A		X					
F	A				~~D~~		X	
G	A				~~D~~			S
H	A				~~D~~			S

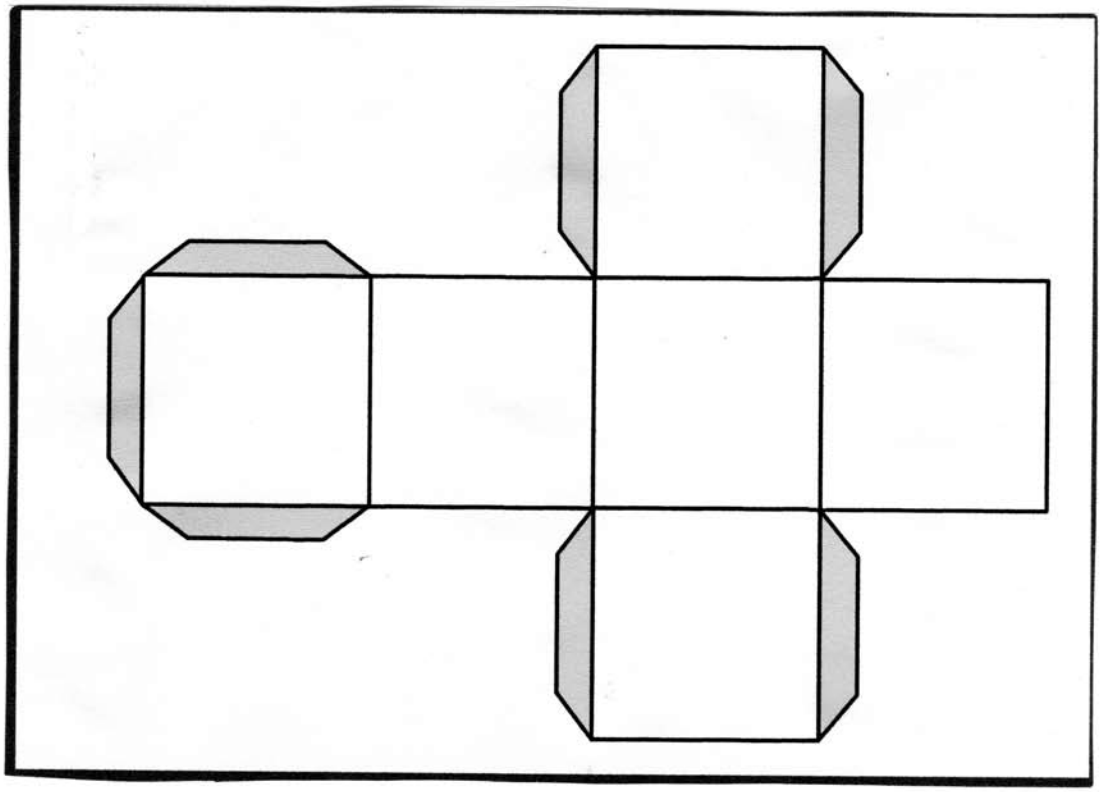
My opponent's ships

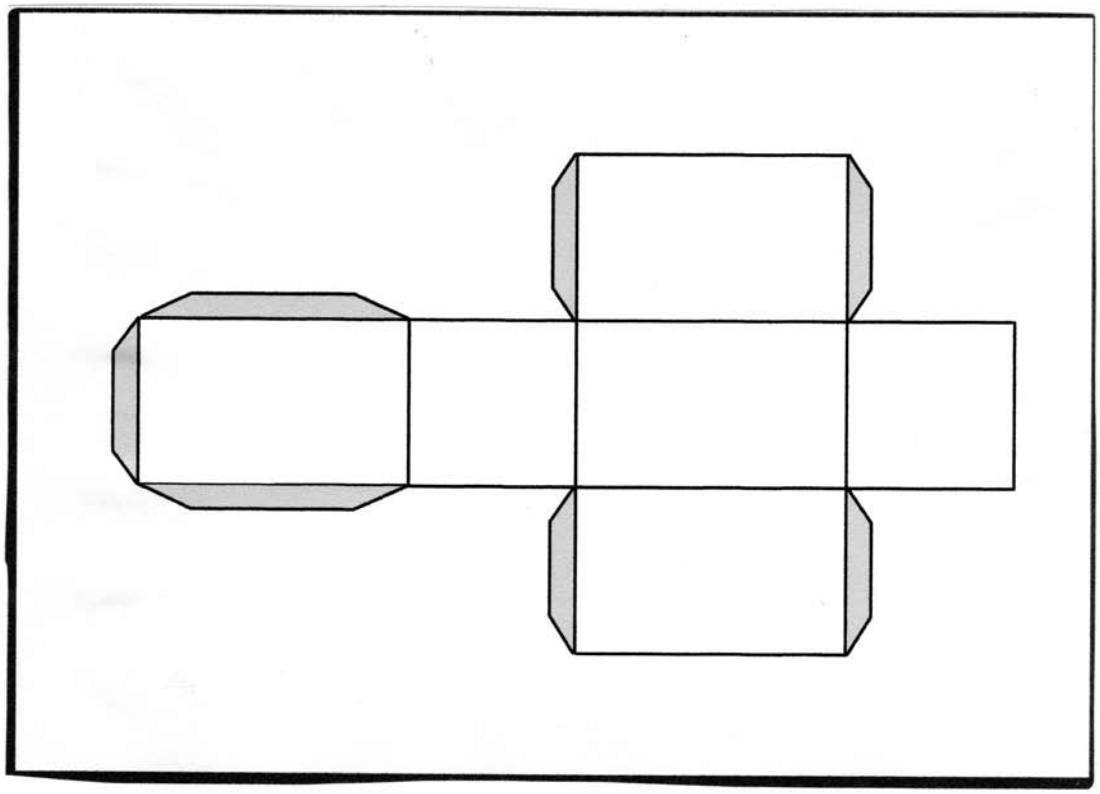
	1	2	3	4	5	6	7	8
A								
B		X						
C								
D		D				X		
E				X				
F								
G					S	S		
H								

When one of the players' ships have all been sunk, the game ends.

ADDENDUM NETS

Note: Learners must not measure the grey, shaded areas. These are the glue flaps.





ADDENDUM

THE CHAIN MATHS QUIZ GAME: A simplified classroom of the TV game "The Weakest Link"

RESOURCES:

- Small chalkboards and piece of chalk for each of 8 learners (or piece of paper and pencil)
- Stopwatch or timer with seconds' hand
- 100 or more prepared Maths questions
- "Smarties" or other reward. Each point scored = 1 Smartie
- Chairs for contestants

LEARNERS' ROLES:

- 8 (or 6) contestants (choose learners who will not be too sensitive if they are voted off)
- 1 or two timekeepers
- 1 or 2 scorekeepers
- Teacher to be quizmaster.
- Audience (all the learners who do not have other roles).

TO PLAY

- The 8 contestants sit on chairs, at the front of the class facing the audience (i.e. their backs are to the chalkboard)
- Ask the timekeeper to start the stopwatch when you are ready. He must tell you when four minutes are up.
- The scorekeeper will make a tally chart for each correct answer. If a learner answers incorrectly, or passes (if he/she does not know the answer), the scorekeeper must make a x on the tally chart:

Round no.	Tally	Total (-5 for each x)	No. of Smarties earned
1	//// /// x ////	12-5=7	7

- After 4 minutes are up, the scorekeeper can total the points.
- The contestants must vote off the person who they think answered the most questions incorrectly. They vote by writing the contestant's name on the small chalkboard or piece of paper, and, on your signal, turn it over to show who they think must leave the team. The contestant with the most votes joins the audience, leaving 7 contestants.
- Round 2 begins, also 4 minutes.
- Repeat until there are only two contestants left, reducing the time for each round (after round 2) by 20 seconds.
- Ask the last 2 contestants 5 questions each, in turn, and the contestant who gets the most questions correct is the winner (if they both have the same number of correct answers, continue until one learner makes a mistake) and gets all the Smarties.

EXAMPLES OF QUESTIONS: These should be to test Maths facts and simple calculations.

How many sides does a pentagon have?

How many right angles in a square?

What is the third multiple of 7?

Give an equivalent fraction for $\frac{1}{2}$

What is the top number in a fraction called?

What is the bottom number in a fraction called?

How many minutes in an hour?

How many days in January?

What unit of measurement do we use to measure water?

How many grams in a kilogram?

What is the largest 4-digit number?

How many factors does the number 3 have?

What is 12x12?

How many faces does a cube have?

How much is 56 rounded off to the nearest 100?

What is the place value of the second digit after a decimal comma?

$\frac{1}{4}$ = ……..%

How many lines of symmetry in a square?

If I toss a coin, what are the chances of it landing on heads?

How much is $\frac{1}{5}$ of 30?

What is $2\frac{2}{5}$ as an improper fraction?

Round 12 off to the nearest 100

What is the place value of the first digit in a 9-digit number?

How many 7s in 49?

I am a 4-sided figure. My opposite sides are equal and I have four right angles. What am I?

The distance around a square is called its ……

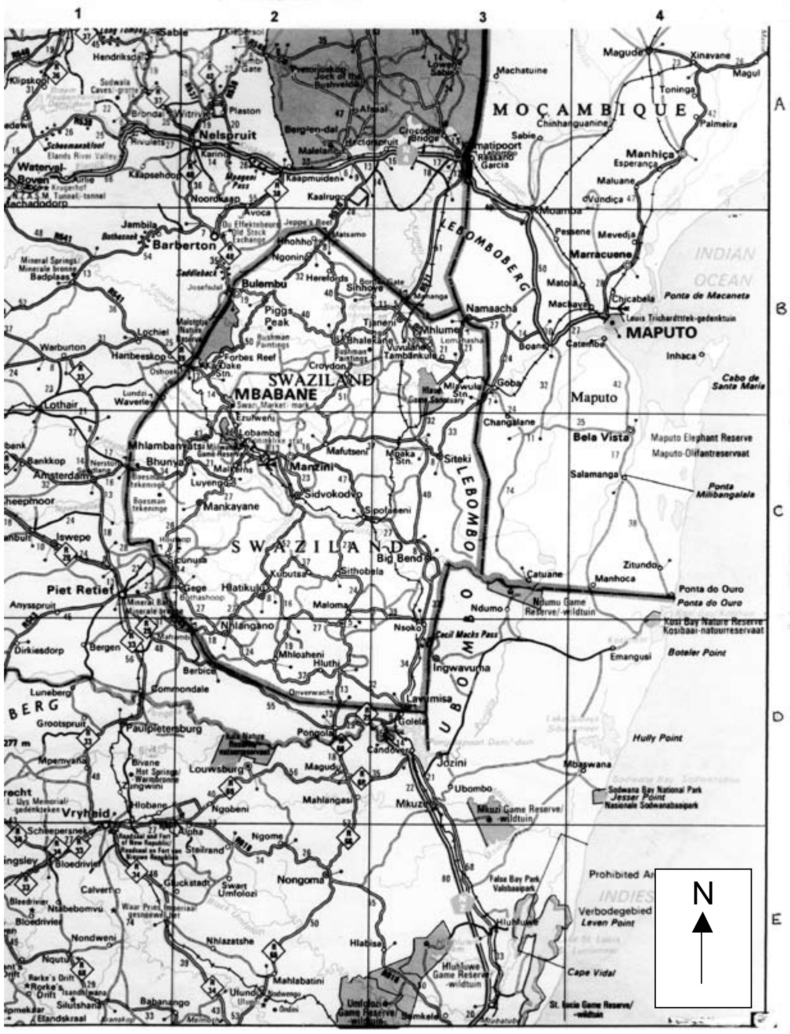
If I multiply length times breadth times height, I will find the …… of a rectangular prism.

How many days in October?

ADDENDUM: GRID LOCATIONS TREASURE MAP and COUNTRY MAP

	1	2	3	4	5	6	7	8	9	10
A										
B										
C										
D								Whale Bay		
E										
F										
G						 Swamp				
H										
I										
J										

- Examples of questions:
  - What is the grid location of: the ship; the treasure; the alligator in the swamp?
  - How do you move to get from the fort to the treasure?
  - The alligator goes from the swamp to the fort. How will he move?
  - Start at the ship. Move 3 blocks south and 2 blocks west. Draw a cross in that block and write down its grid location.
  - The ship sails from where it is moored, past the lighthouse and docks in Whale Bay. Write down how it would get there.



- Possible questions (examples);
  - What is the grid location of Maputo?
  - Name three towns in D;2
  - If you were to travel from Piet Retief to Vryheid, how many blocks and in which direction/s would you travel?
  - Is Barberton north/south/west or east of Nelspruit?

Notes:

Notes: