Foundations For Learning

Intermediate Phase Mathematics Lesson plans

Second term

Grade 6

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SECOND 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 4a, 8a, 10d,** • Recognise the place value of digits in whole numbers to a minimum of 7-digit numbers • Estimate and calculate by selecting and using operations appropriate to solve problems that involve rounding off to the nearest 5, 10, 100 and 1 000 • Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating.		**AS 5** • Draw enlargements and reductions of 2-dimensional shapes (at least quadrilaterals and triangles) using grid paper to compare their size and shape		
WEEK 2	**AS 5a, 8b** • Recognise and use equivalent forms of common fractions with 1-digit denominators • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of whole numbers		**AS 5** • Draw enlargements and reductions of 2-dimensional shapes (at least quadrilaterals and triangles) using grid paper to compare their size and shape	**AS 4d, 6d** • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Temperature (degrees Celsius) • Use of appropriate measuring instruments to appropriate levels of precision including thermometers to measure temperature.	

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	MENTAL STRATEGIES ARE DONE EVERY LESSON				
WEEK 3	**AS 8d, 10a, 10e** • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiplication of at least whole 4-digit by 1-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including multiplying in columns and using a calculator			**AS 4c, 6b** • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Length (millimetres, centimetres, metres and kilometres) • Use of appropriate measuring instruments to appropriate levels of precision including rulers, meter sticks, tape measures and trundle wheels to measure length	
WEEK 4		**AS 1a, 1b** • Investigate and extend numeric and geometric patterns looking for a general rule or relationships represented in physical or diagrammatic form and not limited to sequences involving constant difference or ratio.		**AS 4c, 6b** • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Length (millimetres, centimetres, metres and kilometres) • Use of appropriate measuring instruments to appropriate levels of precision including rulers, meter sticks, tape measures and trundle wheels to measure length	

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	MENTAL STRATEGIES ARE DONE EVERY LESSON				
WEEK 5	• **AS 8c** Estimate and calculate by selecting and using operations appropriate 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 1, 2** Read, tell and write analogue, digital and 24-hour time to at least the nearest minute and second. • Solve problems involving conversion between appropriate time units including time zones and differences.	
WEEK 6	• **AS 6a, 8c** Solve problems in context such as financial (simple budgets) • Estimate and calculate by selecting and using operations appropriate 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 2** Solve problems involving conversion between appropriate time units including time zones and differences.	
WEEK 7	• **AS 4b, 6a, 8g,** Recognise the place value of digits to at least 1 decimal place. • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of positive decimals with at least 1 decimal place. • Solve problems in context such as financial (profit and loss).	• **AS 4** Write number sentences to describe a problem situation within a context.			

	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 8	• **AS 8d, 8e, 8j, 10a.** Estimate and calculate by selecting and using operations appropriate to solve problems that involve - Multiplication of at least whole 4-digit numbers by 1-digit numbers - Division of at least 4-digit by 3-digit numbers - Multiple operations of whole numbers with or without brackets. Use a range of techniques to perform written and mental calculations with whole numbers including multiplying in columns.				

	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 9				• **AS 4a, 4b, 5, 6b** Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for - Mass (grams and Kilograms) - Capacity (millilitres and litres) • Solve problems involving selecting, calculating with and converting between appropriate SI units listed above. • Use of appropriate measuring instruments to appropriate levels of precision including: - bathroom scale, kitchen scale and balances to measure mass - Measuring jugs to measure capacity.	
WEEK 10			• **AS 4** Use the vocabulary and properties of rotations, reflections and translations to describe relationships between 2-dimensional and 3-dimensional objects (including transformation and symmetry).	• **AS 3** Describe and illustrate ways of representing time in different cultures throughout history	

THE ASSESSMENT FRAMEWORK: TERM 2 - GRADE 6 MATHEMATICS

	INFORMAL ASSESSMENT TAKES PLACE ON A REGULAR BASIS THROUGHOUT THE TERM					
FORMAL:	**MENTAL STRATEGIES**	**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	NO FORMAL ASSESSMENT					
WEEK 3	NO FORMAL ASSESSMENT					
WEEK 4	AS 9a, 9b: Mental calculations involving addition and subtraction, multiplication of whole numbers to 12x12.	AS 5a: Equivalent fractions with 1-digit denominators. AS 1: Solve problems in context such as measurements in Natural Science and Technology. AS 8b, d, e: Estimate and calculate by selecting and using operations appropriate to solve problems that involve - Addition and subtraction of whole numbers - Multiplication of at least 4-digit by 1-digit numbers - Division of at least 4-digit by 3-digit numbers AS 10c,d: Use a range of techniques to perform written and mental calculations with whole numbers including: - Building up and breaking down numbers - Rounding off and compensating.	AS 1b: Investigate and extend numeric and geometric patterns looking for a general rule or relationships not limited to sequences involving constant difference or ratio.	AS 5: Draw enlargements and reductions of 2-dimensional shapes using grid paper	AS 5: Solve problems involving selecting, calculating with and converting between appropriate SI units of Length and Temperature.	

ASSESSMENT TASK 1 COMPLETED						
WEEK 5	NO FORMAL ASSESSMENT					
WEEK 6	NO FORMAL ASSESSMENT					
WEEK 7	LO1 AS 1, 9a, 9b,: Count forwards and backwards in decimals. Mental calculations involving addition and subtraction, multiplication of whole numbers to 12x12.					
WEEK 8		AS 8d: Solve problems that involve multiplication of at least whole 4-digit by 1-digit numbers LO 1 AS 10a: Use a range of techniques to perform written and mental calculations with whole numbers including multiplying in columns.			LO4 AS2: Solve problems involving calculation and conversion between appropriate time units including time zones and differences.	

WEEK 9		Recognise the place value of - As 4a whole numbers to a minimum of 7-digit numbers - AS 5b decimal fractions to at least 1 decimal place. AS 6a: Solve problems in context such as financial (profit and loss) Solve problems that involve: - AS 8c addition and subtraction of Mixed numbers - AS 8h: addition and subtraction of positive decimals with at least 1 decimal place - AS 8j: multiple operations of whole numbers with or without brackets	AS 4: Write number sentences to describe a problem situation within a context.		.	
ASSESSMENT TASK 2 COMPLETED						
WEEK 10	NO FORMAL ASSESSMENT					

Grade 6: Week 1

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 4a, 8a, 10d, **LO 3 AS 5**	**Milestones:** • Recognise the place value of digits in whole numbers to a minimum of 7-digit numbers • Estimate and calculate by selecting and using operations appropriate to solve problems that involve rounding off to the nearest 5, 10, 100 and 1 000 • Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating. • Draw enlargements and reductions of 2-dimensional shapes (at least quadrilaterals and triangles) using grid paper to compare their size and shape.

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: 7-digit whole numbers	Place value: 7-digit whole numbers	Rounding off	Compensating	Enlarging shapes
Resources	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets, cm^2 paper

WEEK 1 : Day 1

Notes to the teacher:

- The learners are at a stage where Mathematics is becoming less concrete and more abstract. As the numbers they are working with are becoming larger, it is not practical to use concrete aids to learning.
- For the next few days, the focus will be on number work, including rounding off and compensating, breaking down and building up of numbers and place value.
- Today's lesson will focus on place value. The importance of place value cannot be stressed enough. We only use 10 digits (0-9) in our entire number system. With these digits we can create very large numbers. Where the digit is placed in a number gives that digit a value.
- These concepts were practised in Term 1. They should be constantly practised and reinforced, not just thought of as a separate entity.
- Although recognising place value of 7-digit numbers is a requirement for Assessment Task 2, it is a good idea to start it early in the term to give the learners time to be familiar with 7-digit numbers.
- Use compensating as often as possible when doing Oral and Mental Activities

Resources:

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write the following sums on the board and let the learners complete them in their groups. See which group can finish first and have the most sums correct.
  - 4 560+□=5 000
  - Halve 8 654
  - Double 3 566
  - What number is 300 more than 5 985?
  - What number is 400 less than 3 020?
  - What number lies half way between 5 600 and 6 300?
  - Write down the next number: 104; 99; 94; 89; ……
  - What number multiplied by itself equals 64?
  - Write down the multiples of 7 between 40 and 60
  - Half of 424 plus 288=□

Concept Development (30 minutes)

- Give the learners a cardboard strip measuring approximately 3cm by 33 cm. They must divide it into 11 equal parts, write the digits 0 to nine on each square, leave one square blank and cut the strip into squares. Cut the blank square into two. Ask the learners whether there are any numbers (digits) that we use that do not appear on their squares. There are not, because all the numbers in our number system use only these 10 digits. Explain to the learners that they are now going to use these digits to make numbers according to instructions that you give. The blank cards must be used to show a space between digits in a number with more than 3 digits, as if we were writing the number. Learners can compare each other's answers.

		0	1	2	3	4	5	6	7	8	9

- Make the smallest 3-digit number (you cannot start with zero). Ask a few learners to say the number. (123 – a hundred and twenty three)
- Make the largest 3-digit number. Ask a few learners to say the number. (987 – nine hundred and eighty seven)
- What is the sum of the two numbers you have made? What is the difference?
- Make the smallest 4-digit number. Make sure that you have a space in the correct place (use the blank card) (You cannot start with zero). Learners say the number.
- Make the largest 4-digit number. Say the number in words.
- Do the same with 5-digit numbers.
- Do the same with 6-digit numbers. Using the largest 6-digit number (987 654), ask questions such as:
  a) "What is the value of the 5?"
  b) "What is the value of the 8?" (do each digit in random order)
  c) "What digit is in the Hundred Thousands (H-Th) place?"
  d) "What digit is in the Thousands place?"
- Tell the learners to make the smallest 7-digit number. They should be able to place the number cards to do this, but might not be able to read the number as this is new. Walk around and ensure that all the learners have put a space card between the 1st and 2nd digits, and between the 4th and 5th digits: 1 234 567. See if any of the learners can tell you the value of the 1. It is a million. Write 1 000 000 on the board and point out how many noughts it has. Now try to read the number they made with their number cards: 1 million, 2 hundred and thirty four thousand, 5 hundred and sixty seven.

> TIP: Reading a number like this often causes difficulty, particularly the 234 in the example above. Help the learners like this: The first digit is 1 million. The last three digits are read five hundred and sixty seven. That sorts out the beginning and end of the number. In the middle, read the three digits like you read the last three digits, except say "thousand" after it. We do *not* say "hundred thousand" and "ten thousand" when we say a large number. We only use H-Th and T-Th when we want to recognise the place value of one digit.

- Write the following on the board: M H-Th T-Th Th H T U. Say each place value in words (Million, Hundred Thousand, Ten Thousand, Thousand, etc). Ask a learner to come to the board to write: 1 in the Tens place, 6 in the Million place, 3 in the Units, 4 in the hundred thousand place, 7 in the hundreds place, 0 in the ten thousands place, 9 in the thousands place. He will have written: 6 409 713. Make sure the number is written with the correct gaps. Get individual learners to say the number.
- Repeat this with another learner and another number. Let the learners who are sitting at their desks build the number with their number squares at the same time. Practise saying each new number.

- Let the learners work in two's with their number cards. One can tell the other what digits to place where (he also does it) then they can check each other and read the number to each other. Let each learner have two turns (they will have made 4 numbers in total). Walk around and monitor the learners, checking that they are doing the right thing. Ask random learners to say numbers to you.
- Use 7 654 321 as an example. Go through each digit, randomly, and ask the learners the *place value* and the *number value* of that digit. You can complete a table like the one below on the board:
- 1: Place value = Unit. Number value = 1
  4: Place value = T (Thousands). Number value = 4 000
  7: Place value = M (Million). Number value = 7 000 000
  3: Place value = H (Hundreds). Number value = 300

Consolidation (20 minutes)

- Find examples in textbooks, make a worksheet or write examples on the board for learners to complete on their own in their workbooks. Help learners in small groups while others are busy. Examples should not include expanded notation, this will be dealt with tomorrow, but should include:
  - Arranging numbers in ascending (from smallest to biggest) order: 2 364 574 2 436 754 2 346 475 2 463 457
  - Arranging numbers in descending order (from biggest to smallest)
  - Writing numbers with digits in certain places
  - Writing down the place value and number value of underlined digits, e.g. 5 4<u>8</u>7 124
  - Writing down the place value and number value of the 3 in the following numbers: 345 789
    1 237 544 3 897 210 etc.
  - Writing large numbers in words and vice versa.
    Learners can complete the work for homework.

ASSESSMENT	**Informal :** Observe through learners' responses whether they are grasping this important concept.

WEEK 1 : Day 2

Notes to the teacher:

- Today's lesson is a continuation of yesterday's, but will focus more on writing large numbers in expanded notation and on building up numbers.
- This is not a new concept to the learners. It is now being extended to include millions.

Resources: Chalkboard, textbook, calculators.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write a 7-digit number on the board. Ask the learners to write down, individually, the answers to questions you ask. For example, you write the number 3 452 786. Ask the learners to write down the number that is:
  - 1 000 more
  - 2 million less
  - 20 less
  - 100 000 more
  - 500 less …… than the number you wrote on the board.
- Play "Zap" on calculators. See Addendum for instructions.

Concept Development (20 minutes)

- Use the number you wrote on the board earlier. Tell the learners you are now going to expand the number. Explain what the word expand means. It means to stretch it out by separating the numbers of different place values from each other. First do this by using number value. Do the first one, then ask learners to come to the board individually to write down the subsequent numbers:
  - 3 452 786 = (you write) 3 000 000 + (now let the learners continue) 400 000 + 50 000 + 2 000 + 700 + 80 + 6. Say the whole number before expanding it, and then let the learners read the expanded version.
  - Now do the same, but this time write the number in expanded notation using *place value*: 3 452 786 = (3x1 000 000) + (4x100 000) + (5x10 000) + (2x1 000) + (7x100) + (8x10) + 6
  - Do another two or three examples using place value. From now on, it is the only way they must do expanded notation. Let the learners take turns to write the numbers on the chalkboard. Do not write the first number, let the learners do that.
  - Give the learners three or so examples to do in their groups. See which group can finish first. Afterwards, let each group have a turn to read out their answers.
- Move on to building up numbers, the opposite of expanded notation. When you do so, do not always start with the biggest place value (millions). Write about five expanded numbers on the board (or have prepared printed copies to give to each group) and tell the learners to write down the number that is equal to:

- (4x1 000 000) + (3x100 000) + (2x10 000) + (8x1 000) + (5x100) + (1x10) + 4. This number starts with millions and works to units.
- (4x100) + (3x10) + (8x100 000) + (7x1 000) + (7x1 000 000) + (2x10 000) + 5. This number is in random order.
- (3x1) + (8x10 000) + (5x1 000 000) + (2x100) + (9x100 000) + (6x10). This number has nothing in the thousands place. The learners must put a zero in the thousands place. After the groups have finished, explain this to them, although many of them will probably know it. The above number is: 5 980 263.

Consolidation (20 minutes)

- Find examples in textbooks or make worksheets to practise building up of numbers and writing 7-digit numbers in expanded notation. Spend time working with each group to see that each learner understands the work. Include more practice in work done yesterday, e.g.:
  - Writing numbers in words
  - Finding the value of underlined digits.
  - Writing numbers that are e.g. 1 000 or 10 000 more than or less than 1 453 421

Problem Solving (10 minutes)

- Find or write your own problems which involve place value. For example:
  - The farmer planted 13 452 seeds. The birds ate 2 000 of these seeds. How many seeds were left?
  - Last year, 4 567 298 people immigrated to South Africa. This is 300 000 more than the previous year. How many people immigrated the previous year?
  - The bakery bakes 9 348 loaves of bread during the week. If the bakery bakes 4 000 fewer loaves of bread over the weekend, how many loaves does it bake over the weekend?

ASSESSMENT	**Informal :** Check the learners' workbooks to see if they understand this work.

WEEK 1: Day 3

Notes to the teacher:

- The focus of today's lesson is on rounding off and compensating. Although this is being dealt with in a lesson, it must not be seen as a concept to be learnt and forgotten. It must be applied in all calculations. We use rounding off when we go to the shops – we keep a mental tally (by rounding off) of how much the groceries we are putting in our trolley cost so that we are not short of money when we have to pay at the till. Even if we use a calculator, we should have an idea of the answer, as we often make a mistake when punching in numbers on the calculator.
- Rounding off is not a new concept. However, there are learners who still have difficulty, so it is important you spend time with them to help them understand.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Adding 19 to numbers. Ask the learners if they know a quick way to add e.g. 23 and 19 in their heads. Get a few ideas. Then explain that we can do this by compensating. 19 is 1 less than 20. We add 1 to 19 to equal 20. Then we have to subtract 1 from the 23 to make it 22. 20+22=42. Give the learners another example, then ask them to complete 10 or more examples in their workbooks:
  - 45+19 27+19 68+19 133+19 203+19 etc.

Concept Development (20 minutes)

- Give the learners the following problems to solve in their groups. Say the problems, but write the numbers on the board. See which group finishes each problem first. Tell the learners you don't want an exact answer, you want an approximate answer. Ask the group which finished first each time to explain what they did and discuss this with the whole class.
  - In the Cape Epic Cycle Race, cyclists ride the following distances over 5 days: 82km, 143km, 152km, 78km, and 137km. Approximately how far did they cycle altogether? The learners should come up with an answer of 600km. They round off each distance to the nearest 100km (respectively 100km, 100km, 200km, 100km, and 100km = 600km). Let the learners check on their calculators to get the exact answer, which is 592km. Close enough!
  - I have to pay a few accounts and go shopping, so go to the ATM to withdraw money. The ATM only gives money in R100s. How much must I withdraw to have enough to pay the telephone R123, electricity R118, the doctor R94, shopping R362? By rounding off to the nearest R100, the learners will come up with an answer of R700. Let them check the actual amount on their calculator, it is R697.
- Write a 5-digit number on the board, e.g. 17 528.

- Tell the learners that you are going to round the number off to the nearest 10. Which digit is in the Tens place? It is the 2. So which digit must we look at? The digit to the right of it (you can call this the helper digit), i.e. the 8. We do not have to worry about any of the other digits, they will stay the same. Does the helper digit help the 2 stay a 2 or change to it to a 3? It helps it change to a 3. The helper digit becomes a 0. 17 528, rounded off to the nearest 10 is 17 530. Write this on the board: 17 528≈17 530. The learners must use the "approximately equal to" sign (≈), and never use the = sign unless the numbers are actually equal. (Explain that the '=' sign means "is equal to".)
- Repeat the above, rounding off to the nearest 100 and 1 000. Each time the learners need only look at the digit to the right (the helper digit) of the place value to which you want to round off to. The helper digit and all digits to its right change to 0.

• Briefly revise rounding off to the nearest 5. This has been done in Grade 5 and in the first term this year. Here the learners look at the units digit. If it is a 3, 4, 5, 6 or 7, the units digit remains the same. If it is an 8 or 9, the digit in the tens place will become larger, e.g. 17 528 rounded off to the nearest 5 is 17 530. If the units digit is a 1 or 2, the digit in the tens place becomes smaller and the units become 0. 17 562≈17 560

Consolidation (15 minutes)

• By taking note of how the learners participated in the class discussion, you will have an idea of who still does not understand this work. Take these learners aside and help them to complete the table below. Use number lines if necessary. The rest of the learners can work alone to complete the table.

Number	Nearest 5	Nearest 10	Nearest 100	Nearest 1 000
456				
1 253				
36 489				
852 613				
1 582 624				

Problem Solving (15 minutes)

• Give the learners problems to do which entail rounding off. In each problem, they must decide which digit the most suitable to round off is. The learners do not need to give an exact answer to the problems. If you cannot find any suitable problems in the textbooks, make your own. Examples:
- In our school, there are 4 Grade 6 classes. Each class has the following number of learners: 34, 38, 42, 44. Approximately how many learners are there altogether in Grade 6?
- Between 8 o'clock and 10 o'clock, the following numbers of passengers boarded aeroplanes at Cape Town airport to fly to Johannesburg. 323, 284, 273, 187, 312. Approximately how many passengers boarded aeroplanes during that time?

- In the 2009 General Elections, the following numbers of people came to vote at 5 different polling stations during the morning: 1 258, 3 524, 7 469, 2 388 and 5 431. Approximately how many people voted at those polling stations?

ASSESSMENT	**Informal :** Assess the learners' oral responses and written work.

WEEK 1: Day 4

Notes to the teacher:

- Today's lesson focuses on compensating when doing addition. Learners have been taught the basics of this when adding on 9 and 19 and so on in Mental and Oral work.
- It is a useful mental strategy. When you add two numbers, you can round one of the numbers off to the nearest appropriate power of 10. Whatever you add to the one number, you subtract from the other number. So for example, 78+44. Add 2 to 78=80. Subtract 2 from 44=42. 80+42=122.

Resources: Chalkboard, textbooks, worksheets, lengths of string or strips of paper, scissors

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some addition sums which entail using number bonds, and adding on 9 and 19. Give the examples orally and let each learner write down the answer. Do about 20 then let the learners swop books to mark each other's work. Discuss the use of number bonds and compensating to make addition easier. Examples:
  - 52+48 67+23 115+25 78+32
  - 85+9 127+19 36+29 101+119

Concept Development (15 minutes)

- Give each group of learner two lengths of string. Ask them to place them as if they were joined together and put pencils or erasers down at each end of the "joined" piece of string to mark its approximate length.
  - Ask them to cut a piece off the one piece of string, add it to the other piece and measure the three pieces together again. The new three pieces are the same length as the original two.
  - Give the learners two new pieces of string and repeat the process. What can we conclude? If we take away a piece of string from one length and add it to the other length, the total length will be the same.

- Apply this to addition Tell the learners to think about what they learnt from the Mental Maths discussion and from using the string. Can they, in their groups, think of a quick way to add 78 and 75 in their heads? Let whichever group has their hands up first explain what they did. They can do this on the board, showing their thinking: 78+2=80. Because I added 2 to 78, I must subtract 2 from 75. 75-2=73. 80+73=153.
- Other learners might have subtracted 5 from 75 = 70. They would then have added 5 to 78 = 83. 70+83=153.
- Give the learners two or three more examples to work out in their groups. If you feel your learners are grasping the concept easily, you can include larger numbers where the learners round off to the nearest 100, e.g. 95+123=100+118=218.

Consolidation (15 minutes)

- Give the learners about 10 to 20 addition exercises to do in their workbooks. They must show their thinking each time, i.e. how they are compensating.

Problem Solving (20 minutes)

- Give the learners problems to solve that give them practice in the work done so far this week. You can also include revision from last term in the 4 operations, i.e. addition, subtraction, multiplication and division. Choose an area where you feel your learners need particular practice. They can continue with these in tomorrow's lesson.

ASSESSMENT	**Informal :** Observe the learners' interest and participation in class and mark their books.

WEEK 1: Day 5

Notes to the teacher:

- Drawing enlargements and reductions on cm^2 paper is something that learners usually find fairly easy and quite a lot of fun.
- Today the learners will learn to enlarge different quadrilaterals and triangles on cm^2 paper and examine the difference it makes to how many squares are enclosed by the different size shapes. This is a basic introduction to the concept of area.
- We talk of scale when changing the size of a drawing. The scale is written, e.g. 1:2. We say this "one to two". It means that every unit of measure on the picture we want to enlarge is doubled. If we use an enlargement scale of 1:3, it means each dimension on the new drawing is 3 times that of the original. Make sure your learners know the vocabulary.

Resources: Textbook, chalkboard, blank square paper, square paper with shapes on it (see Addendum)

DAILY ACTIVITIES

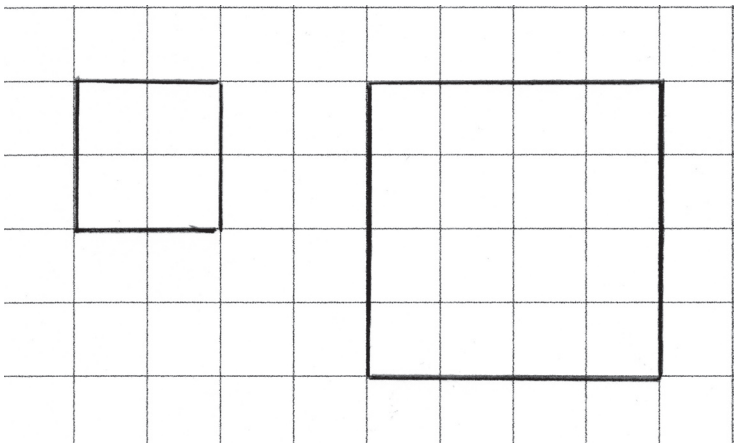
Oral and Mental Activity (10 minutes)

- Do some 12 times table drill. Remind the learners that multiplication is commutative (they do not need to know the word), i.e. 12x6=6x12. Therefore, if they know all their times tables up to 12, the 12 times table is easy.
  - Count forwards and backwards in multiples of 12.
  - Groups of learners or individuals can say the 12x table.
  - Do drilling using the "Multiplication clock" (See Addendum – Mental strategies). It is important that the learners know their tables randomly, not just by rote.
  - Do a written task which includes division, e.g. fill in the answers (do about 20 examples); 5x12=□; □÷12=5.

Concept Development (15 minutes)

- Ask the learners if they know what the word "enlarge" means. It means to make bigger. Tell them that today they are going to learn to enlarge geometric shapes.
  - Give each learner a copy of the Addendum: Shapes for enlarging.
  - Ask them what we call all the shapes with four sides. (Quadrilaterals). Then ask them what each quadrilateral is called. What do we call the shapes with three sides? (Triangles)
  - Tell them to look at the square. Let them measure it, or measure each small printed square, to tell you its dimension. It is 2cmx2cm.
  - Ask them what they think they would have to do if you told them to enlarge it to the scale of 1:2. Write 1:2 on the board. Listen to their ideas. Then explain that we use scale to enlarge a drawing. 1:2 is the scale. It means that for every centimetre on the drawing we want to copy, we draw 2 centimetres to enlarge it. If we say *Draw to a scale of 1:2* we will enlarge the drawing, because the first number relates to the original.
  - Refer to the square again. It is 2cmx2cm, we must make the new square 4cmx4cm.

- Let the learners enlarge the square onto the blank square paper. Walk around and check that they are doing it correctly.



SCALE 1:2

- Ask the learners how many small squares were enclosed in the original square, and how many are enclosed in the enlarged square. The enlarged square contains 4 times the number of small squares as the original square. Ask the learners whether the shape has changed. It has not, it is only bigger.
- Repeat the above with the small rectangle.

Consolidation (25 minutes)

- Let the learners complete enlarging all the shapes.
  - They can cut out the original shape and the enlarged shape, and paste them next to each other in their workbooks with "scale 1:2" written on or under the enlarged shape (see the example above).
  - See if they can make a rule for the shapes, "When we enlarge to a scale of 1:2, there are …… times as many small squares as in the original shape."
  - Then challenge them to copy two shapes of their choice in the scale 1:3

Problem Solving (10 minutes)

- Learners can continue with and complete problem solving from yesterday's lesson.

ASSESSMENT	**Informal :** Walk around the classroom while the learners are busy working and check that they are following instructions properly.

Grade 6: Week 2

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 5a, 8b **LO 3 AS 5** **LO 4 AS 4d, 6d**	**Milestones:** • Recognise and use equivalent forms of common fractions with 1-digit denominators • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of whole numbers • Draw enlargements and reductions of 2-dimensional shapes (at least quadrilaterals and triangles) using grid paper to compare their size and shape • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Temperature (degrees Celsius) • Use of appropriate measuring instruments to appropriate levels of precision including thermometers to measure temperature.

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:	Addition of 7-digit numbers	Subtraction in columns	Temperature	Fractions with single-digit denominators	Reducing shapes
Resources	Chalkboard, Textbooks, worksheets	Chalkboard, Textbooks, worksheets	Chalkboard, Textbooks, worksheets. Thermometers (or at least pictures)	Chalkboard, Textbooks, worksheets	Chalkboard, Textbooks, worksheets, cm2 paper.

WEEK 2: Day 1

Notes to the teacher:

- In today's lesson addition of numbers will be dealt with. The Assessment Standards require learners to add whole numbers. Addition of whole 6-digit numbers was learnt in Grade 5. Today's lesson will include some examples of adding 7-digit numbers. However, the central focus will not be on the size of the numbers, but on refinement of methods, improving speed and accuracy and checking answers.
- There cannot be many learners at this stage who cannot add. If they have mastered addition of 5-digit or 6-digit numbers, they will probably be able to use this knowledge to add 7- or 8- or more digit numbers. They were taught the column method in Grade 5 and last term. This is normally the fastest method to add numbers. Therefore, encourage the learners to use this method. If there are learners who are still not happy with this method, let them use their own methods (as long as the methods work and they understand them) but try to help them master the column method.
- Addition is commutative, i.e. 5+6=6+5. Learners should apply this rule when adding numbers.
- If learners are presented with an exercise where they have to add more than three numbers, they often do two separate sums, i.e. add the first two numbers, and then add the third number to the answer they just obtained. Encourage learners to add all the numbers at one time.
- Emphasise checking answers today. The learners who have mastered the column method can check by adding from the bottom of the column to the top. They can then use a calculator.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some addition "Running Maths". See Addendum (Mental strategies) for the instructions.
- Give the learners two flow charts to complete in their groups. The first one must be adding 19, which they have been shown. The second one will be a challenge. See if they can apply their knowledge of adding 19 to find a quick method to subtract 19.
  - After enough time, see which groups were successful. Let the learners come up with a rule: To quickly subtract 19 from a number, subtract 20 then add 1. So 67-19=67-20 (47)+1=48.

Concept Development (20 minutes)

- Give the learners two addition problems to solve in their groups. Walk around and observe their methods. One problem will entail adding two 7-digit numbers, the other adding more than two numbers. Examples:
  - According to the 2006 census, there were 4 739 090 people living in the Western Cape and 2 938 236 living in the Free State. How many people were there altogether in these two provinces?
  - Over the Easter weekend one year, the following tourists went on the ferry to Robben Island: 568 South Africans, 2 254 Germans, 1 785 British, 784 Japanese and 995 people from other countries. How many tourists went to Robben Island that weekend?

- After the groups have completed the problems, ask any group you noticed using the column method correctly to come up and show the class their method on the board.

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

- As the learners do the exercise on the board, emphasise starting with the units and working left. Also emphasise the carrying over, e.g. in the tens place (column) we are adding 9 tens and 3 tens which makes 12 tens or 1 hundred and 2 tens. We write the 2 in the 10s column and carry over the 1, which is one 100, into the Hundreds column.
- Check the addition on the board by adding from the bottom up. Usually we start with the top number in each column, but it is good practice to check by adding the other way around.
- Get the learners to say each number in words.
- Make sure the answer is complete. 7 677 326 people lived in the two provinces.
- Get learners who did the second problem by using the column method to do the sum on the board. Make sure that they line up the units first. Before they start adding, tell them to check that they have written the numbers down correctly. Often learners do not copy the numbers correctly, so they must get into the habit of checking.

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

- Go through the things to remember: Copy the numbers down correctly; line up the units first; start adding in the units column; carry over; and give a complete answer: 6 386 tourists visited Robben Island.

Consolidation (15 minutes)

- Find a variety of addition exercises in textbooks, or write them on the board, for learners to do individually in their workbooks.
  - Let the learners write down an estimated answer first.
  - Examples should include adding 2 or more numbers with the same number of digits, and adding 2 or more numbers with differing numbers of digits.
  - They can check each answer by adding in the reverse direction and with calculators.
  - Work with learners who are still not happy with the column method to help them master it.

Problem Solving (15 minutes) • Give the learners a few problems that entail adding. Ensure that they check their answers and that their answers are complete (people, goats, cars, etc.). Let them first estimate by rounding off.	
ASSESSMENT	**Informal:** Check the learners' books to make sure they can do addition, using their preferred method. Check their progress on adding in columns.

WEEK 2: Day 2

Notes to the teacher:

- Subtraction in columns was taught in the fourth term of Grade 5. Some learners might not have mastered this method, so do not force them to use it. Encourage its use as it is the quickest way to subtract numbers.
- Subtraction is not commutative. (5-3 does not equal 3-5) When subtracting in columns, learners often make the mistake of subtracting the smaller number (in the top row) from the larger number (in the bottom row) instead of borrowing. Do not let the learners make this mistake.
- At this stage, most learners should be able to subtract by at least one method. The Milestones do not specify the size of the numbers that they must be able to subtract. If they can subtract 4-digit numbers, they should be able to subtract 5-, 6- and 7-digit numbers with a little extra guidance. The focus will be on refining methods, improving accuracy and speed, and checking.
- Subtraction is the inverse of adding. Learners must get into the habit of checking their answers by adding.
- Revise and use terminology for subtraction such as difference, less than, minus, subtract.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Ask the learners 10 questions which entail adding on to make 1 000. Give each question orally and learners write down the answers individually in their workbooks. Examples:
  - 712+□=1 000 654+□=1 000
- On the board, write 5 rows of 5 numbers. In each row, 2 numbers must total 1 000. Learners must write these two numbers down in their workbooks. Example:
  - 582 650 450 518 418. Learners write: 582+418=1 000

Concept Development (20 minutes)

- Choose three learners who you know are capable of doing subtraction by different methods to come and work on the chalkboard, which you must divide into three to give each learner space to work. Tell each learner which subtraction method to use.
  - Give the whole class a problem which entails subtraction, such as: *The Nile River is Africa's longest river, being 6 692km long. The Zambezi River is 2 756km long. What is the difference in length between these two rivers?* The learners not working on the board can work in pairs or in groups. Walk around and watch how the learners tackle the problem. Also watch the learners who are working on the board.
  - After enough time, discuss the methods that the learners who worked on the board have used.
  - Method 1: Breaking down the second number.

    6 692–2 756 (2 000+700+50+6)

6 692–2 000=4 692

4 692-700=3 992

3 992-50=3 942

3 942-6=<u>3 936km is the difference</u>.

Method 2: Adding to the smaller number until we get to the larger number:

2 756 → 2 760=4

2 760 → 2 800=40

2 800 → 6 000=3 200

6 000 → 6 600=600

6 600 → 6 692=92. Add: 4+40+3 200+600+92 (90+2) = <u>3 936km is the difference</u>

Method 3: Subtracting in columns:

5 ~~6~~	$^{1}6$	8 ~~9~~	$^{1}2$ -
2	7	5	6
3	9	3	6

<u>The difference is 3 936km</u>.

- In all likelihood, the learner who did the sum using the column method was finished first and this method takes up much less space. See which learners around the class used which method.
- Spend some time going through the column method. Always line up the digits starting with the units column. Start subtracting from the units, and then work left. In the example above, we cannot subtract 6 units from 2. The 2 has to go to its neighbour, who is worth 10s, and borrow a ten from it. By taking a 10 away from the neighbour, the neighbour becomes an 8. Add 10 to the units, the units become 12. 12-6=6. The same borrowing occurs between the Hundreds and the thousands.
- Now check by adding: Add the answer to the bottom number and you should obtain the top number.
- Do two or three more examples of subtraction using the column method on the board, getting the learners to participate by asking them what to do next. Do not worry about the size of the numbers, use 3-digit and 4-digit numbers until the learners understand.

Consolidation (15 minutes)

- Find subtraction examples in textbooks, make a worksheet or write examples on the board for the learners to practice subtraction. Try to get all the learners to understand and use the column method. Give the learners who are still unsure of this method 2- and 3-digit subtraction examples to complete and work with them in a group. However, any learners who are still struggling with column subtraction can use a method they are comfortable with. The rest of the class can do subtraction of 3- , 4- and 5-digit numbers. They must check their answers by adding (as above). The learners can complete these for homework.

Problem Solving (15 minutes)

- Give the learners problems involving subtraction to solve. You can include one or two that entail addition as well. These can be completed for homework. Examples:
  - In 2008 there were 6 432 elephants in the game park. Two years later, there were 7 531 elephants. By how much did the elephant population increase over the two years?
  - My mother had R1 654 in the bank. She paid in her salary of R3 465. She withdrew money to pay her bills which totaled R2 448. How much money did she have left in the bank.

ASSESSMENT	**Informal:** Check the learners' workbooks to ensure that they are able to subtract accurately and that they know to check their answers by addition.

WEEK 2 : Day 3

Notes to the teacher:

- Temperature is something that affects all of us. We talk about the weather being hot or cold, if we are sick we often have a "temperature" (fever), we need to warm the oven up to a certain temperature to cook or bake, and the fridge must be at a low temperature to keep our food cool.
- Temperature should be taught incidentally throughout the learners' school career – they keep weather charts and record temperatures at different times of the year.
- Temperature is a topic that integrates with Natural Sciences.
- We measure temperature in degrees Celsius.

Resources: Different thermometers (or pictures of them – see Addendum), chalkboard, worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners practice in adding 2-digit numbers. Say these orally. Learners must work out the answers mentally and write down the answers only. Give them 15 to 20 examples, then let the learners swop books to mark each other's work. Some examples are:
  - 74+24
  - 58+64
  - 23+88
  - 59+48

Concept Development (25 minutes)

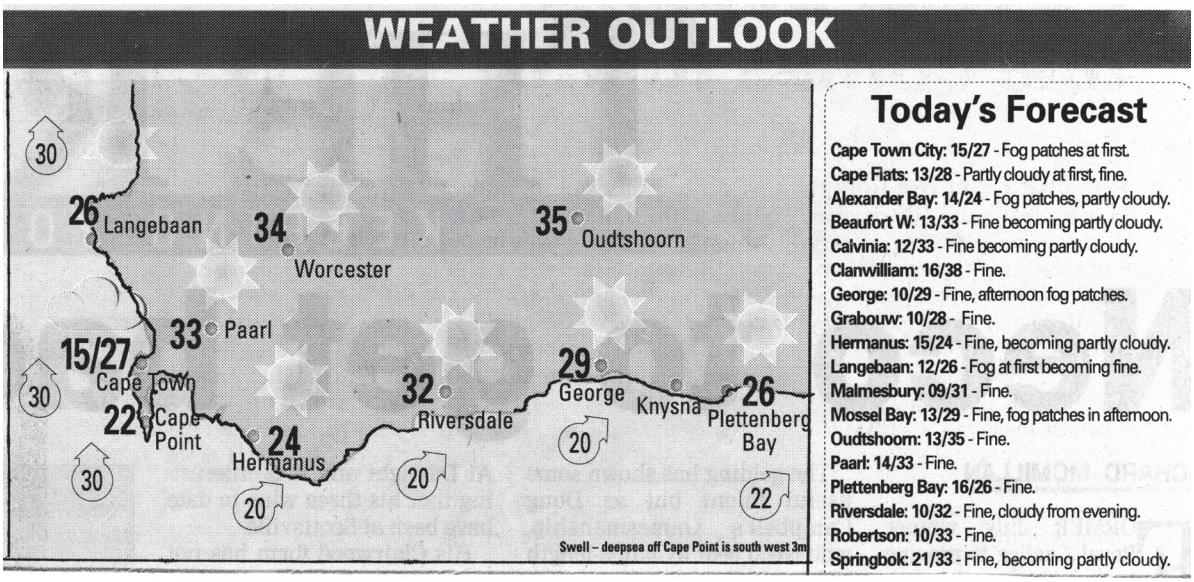
- Give each group of learners the following questions to answer. Make it a competition with a small prize or reward for the group which gets the most answers correct: The answers are on the right for discussion afterwards.

QUESTION	ANSWER
What is temperature?	The measure of how hot or cold something is.
What units do we measure temperature in?	Degrees Celsius
What instrument do we use to measure temperature?	Thermometer
We would bake a cake at approximately ……	150 – 200 degrees Celsius
True or false: We start measuring temperature at 0.	False. We get temperatures below 0
The boiling temperature of water is ……..	100°C
The freezing point of water is …..	0°C
A human's normal body temperature is …..	37°C

- Show the learners the thermometers that you have. If you cannot get any actual thermometers or your own pictures, use the pictures in the Addendum for discussion. Ask the learners questions such as (these are based on the pictures in the Addendum):

- The first thermometer has C and F on it. What do these letters mean? The C stands for Celsius, which we use to measure temperature. The F stands for Fahrenheit, which some countries use.
- How many degrees C are the same as 140 degrees F? 60. These two measures of temperature are not the same, they are not interchangeable. Degrees Celsius does not equal Degrees Fahrenheit. There is a formula to convert the one to the other. However, we can ignore the F markings on the thermometer.
- Look at the markings on the first thermometer. What is its range? -5 to 60. Look at the picture, it gives clues as to what this thermometer might be used for. Probably for measuring the temperature of water.
- Study the next picture. What is its range? 50 to 300. What do you think this would be used for? An oven. It stands in the oven on the shelf, or hooks on the shelf.
- In the next thermometer, there are the words "Min' and "Max". This is a special thermometer that tells us the minimum (lowest) and maximum (highest) temperatures.
- Continue discussing all the thermometers and their uses. A brief discussion of how a thermometer works could also be included.

• Give learners a copy of a weather map such as the one below. Get one for your area if possible.



- Ask a few questions such as: Which town on the map has the highest temperature? Do you think this weather map is based on summer or winter temperatures – why? What does 15/27 mean next to Cape Town? Under "Today's forecast", which town has the highest temperature forecast? And the lowest minimum?

Consolidation (25 minutes)

• The learners can make drawings of 6 thermometers to fill in the correct temperature. They must first match the following list; then show the correct temperature on the thermometer. They should draw thermometers that look like the type that would be used in each case, make sure they are appropriately marked with an appropriate range.

A person's body temperature	0°C
A very hot day in South Africa	100 °C
The boiling temperature of water	180 °C
The temperature on a winter's morning	42°C
The temperature at which water turns to ice.	37 °C
The temperature at which we bake a cake.	6 °C

- Ask the learners to write down answers to questions referring to the map. For example, differences between temperatures, arranging temperatures in ascending order or descending order.
- Do a Data Handling activity. Examples: The learners can make a tally chart of all the minimum or maximum temperatures and present this in a table form. They can determine the mode of the minimum temperatures or the mode of the maximum temperatures (they learnt mode in Grade 5 – it means the temperature that appears the most). They can draw a bar graph (also learnt in Grade 5) representing the maximum temperatures of five or six different towns (choose towns with as varied temperatures as you can).

ASSESSMENT	**Informal:** Assess the learners' abilities to work in degrees Celsius from their oral responses and how well they complete their written task.

WEEK 2: Day 4

Notes to the teacher:

- Today's lesson is about equivalent fractions and comparing fractions with single-digit denominators. The denominators do not have to be multiples of each other.
- The learners have been taught how to make equivalent fractions, but it is a bit more complicated when they have to do so with denominators that are not multiples of each other. They need to find the Lowest Common Denominator.
- Start with some concrete examples to try to help learners establish a rule. Then move on to abstract examples.

Resources: Chalkboard, textbooks, worksheets.

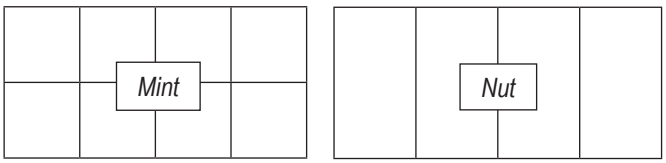
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise recognising multiples.
  - Start by counting forwards and backwards in multiples of different numbers. Do this going around the class, or learner by learner (the first learner can say the first five multiples of a number, then the next learner continues by saying the next five multiples, continue on in this way) or group by group. Do not always start at zero.
  - Give the learners a written task to do individually in their books. Examples:
    a) Write down the third to seventh multiples of ….
    b) Write down the first ten multiples of 3 and 7. Circle all the common multiples.
    c) What is the sixth multiple of …..?
    d) Which of the following numbers are multiples of 5 and 8? 10; 20; 30; 40; 48; 75; 80

Concept Development (25 minutes)

- Tell the learners that two boys each have a different slab of chocolate. They each want a taste of each others' but neither wants to give away more than he gets. The slabs are divided like this:



  - Ask the learners what fractions the slabs have been divided into. The Nut chocolate is divided into quarters, and the Mint is divided into eighths. If the boy who has the Nut chocolate gives his friend $\frac{1}{4}$ of his slab, how much of the Mint slab must he get in return to get an equal amount? He must get $\frac{2}{8}$. Remind the learners that we call two or more fractions with the same value equivalent fractions.
  - Do three or four more examples where the denominators are multiples of each other.

- Move on to more complicated equivalent fractions. Now the denominators will not be multiples of each other. Draw slabs of chocolate on the board. One is divided into 2 and the other is divided in 3. Ask the learners to work out, in their groups, how two boys could swop equal amounts of their chocolate in this case. The learners can use scrap paper to cut out and draw on if they want to.

- Some learners will probably come up with the solution which is to cut or break both slabs so that they are both divided into the same number of parts. In this case, they would divide each slab into sixths.

- Do one or two more examples with the learners, drawing pictures or letting them, in their groups, draw pictures.
- Establish a Mathematical rule: If we want to compare two fractions with different denominators, we have to find a number that is *common* to both denominators. Example: to compare $\frac{1}{2}$ and $\frac{1}{3}$, we find the lowest number that we can change 2 and 3 (the denominators) into. This number is 6. $\frac{1}{2}=\frac{3}{6}$. We multiply the denominator, 2, times 3 to get 6, so must multiply the numerator, 1, by 3 to get 3. Similarly, $\frac{1}{3}=\frac{2}{6}$
- Go through this explanation a few times. The golden rule is what you do to the numerator, you must do to the denominator.

Consolidation (25 minutes)

- Find exercises in textbooks to give the learners practice in making equivalent fractions. Exercises should include:
  - Making equivalent fractions with denominators that are multiples of each other.
  - Writing fractions with the same denominator in ascending or descending order.
  - Writing fractions with fractions whose denominators are multiples of each other in ascending or descending order.
  - Work out, by finding a common denominator and converting both fractions, which of a pair of fractions is larger. Start with fractions that have a numerator 1, as the learners can look at a fraction wall to see that. Then progress to fractions which have numerators greater than 1. This will entail converting denominators and numerators.

ASSESSMENT	**Informal:** Gauge the learners' grasp of this concept by observing their oral responses and by checking their workbooks.

WEEK 2: Day 5

Notes to the teacher:

- Last week, learners enlarged geometric shapes to scale. Today they will reduce geometric shapes to scale.
- Once they have mastered enlarging, reducing is simple as it is the reverse process.
- We reduce to a scale of, for example 2:1. The original size is always written first. This means that for every two units of measurement on the original drawing, there will be one unit on the reduction.

Resources: Chalkboard, textbooks, square paper (blank), square paper with shapes for reducing (Addendum)

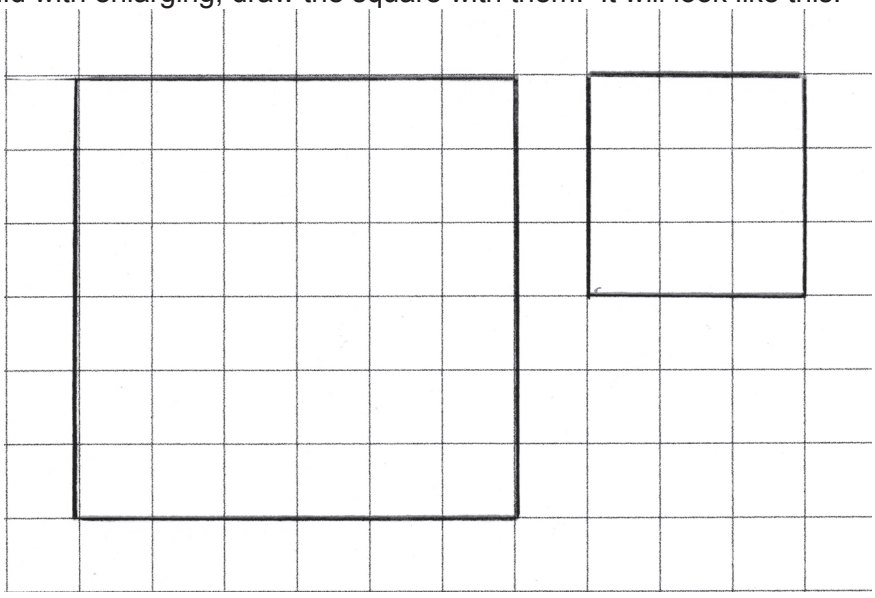
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners practice in subtracting 2-digit numbers. Say 15 to 20 examples orally and the learners must write down the answers only.

Concept Development (20 minutes)

- Let the learners turn to the work in their workbooks that they did to enlarge shapes. Briefly revise with them what they did. Do this in question and answer manner. Ask questions such as:
  - What did we do to these shapes last week?
  - What does it mean to enlarge?
  - What does it mean Scale 1:2 or Scale 1:3?
- Tell them that today, they are going to do the opposite. Do any of them know the word for opposite of *enlarge*? It is reduce. If we reduce to a scale of 2:1, what does that mean? Point out that we always write the dimension of the original drawing first, so if we see an instruction *Draw* to a scale of 2:1, we know the new drawing will be smaller than the original.
  - Hand out the Addendum, shapes to reduce, to each learner. Following the same steps as you did with enlarging, draw the square with them. It will look like this:



SCALE 2:1

Consolidation (20 minutes) • The learners can reduce the shapes on their blank square paper. Afterwards they can cut them out, paste the original and new shape side-by-side, and write the scale under the new shape. They can also observe and write down what happens to the number of cm^2 blocks enclosed in the shapes when they reduce. **Problem solving (10 minutes)** • Revise work done earlier this week by giving the learners problems which entail addition and subtraction, a question about temperature and a question to practise equivalent fractions.	
ASSESSMENT	**Informal:** Mark the learners' books to see that they understand how to reduce shapes. Also check their problem solving, that they have remembered what they were taught earlier this week and can apply their knowledge.

Grade 6: Week 3

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 8d, 10a, 10e **LO 4 AS 4c, 6b**	**Milestones:** • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiplication of at least whole 4-digit by 1-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including multiplying in columns and using a calculator • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Length (millimetres, centimetres, metres and kilometres) • Use of appropriate measuring instruments to appropriate levels of precision including rulers, meter sticks, tape measures and trundle wheels to measure length

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:	Multiplying 4-digit by 1-digit numbers	Multiplying 4-digit by 1-digit numbers	Calculator skills	Measurement: length general introduction, cm and mm	Measurement: length: m, cm and mm
Resources	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets, calculators. Assessment task.	Chalkboard, textbooks, worksheets, rulers, metre stick, trundle wheel	Chalkboard, textbooks, worksheets, rulers, tape measures.

WEEK 3 : Day 1

Notes to the teacher:

- Learners have been multiplying 3-digit by 2-digit numbers. The focus on today's lesson is multiplying 4-digit by 1-digit numbers. No method must be forced on the learners at this stage. In this lesson the column method will be introduced as it is a requirement for Assessment Task 2. The sooner the learners can multiply using this shorter method, the better.
- Multiplication is repeated adding.
- Multiplication is commutative. 6x3=3x6. This is helpful to learners who perhaps know for example 6x3 (three times table) better than 3x6 (6 times table).
- Any number multiplied by 0 is 0.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some practice of the 7 and 8 times tables as these are generally the tables that cause most difficulty. You can start by different learners or groups of learners reciting the times tables, but then do random drill. For example, you can use "Clock Multiplication." (See Addendum for instructions)

Concept Development (20 minutes)

- Give the learners a problem such as the following to solve in their groups: *I have 523 boxes of eggs. There are six eggs in each box. How many eggs do I have altogether?*
  - Let different learners (or groups of learners) show their methods. Some might use the following column method:

	5	2	3 x	
			6	
		1	8	(6x3)
	1	2	0	(6x20)
3	0	0	0	(6x500)

3 000+120+18=3 138 eggs altogether.

  - Using this method as a starting point, show the learners the traditional column method, explaining as you go.

	$^{1}5$	$^{1}2$	3 x
			6
3	1	3	8

Explanation to the learners:

Start with the units. 6x3=18. 18 is 1 ten and 8 units. Carry 1 ten to the tens column and write the 8 in the units column.

Multiply 6 by 2 (digit value) then add the 1 = 13. You cannot write the whole 13 in one column, so write down the 3 and carry the 1 to the hundreds columns.

Multiply 6 by the digit value 5 then add the 1 you carried over. 6x5+1=31. As there are no more digits to be multiplied, write down the entire 31 but in two columns.

- Point out to the learners that this method is quicker once they have mastered it. Do one more example (3-digit by 1-digit) with the learners, asking them questions as to what to do next, so that they are actively involved. Choose a number with a zero in the tens place, e.g. 304x7
- Give the learners, in groups or pairs, another problem involving 3-digit by 1-digit multiplication to try to solve using the method you have just shown them. Go around and check. If they are not able to use this method, do not force them. After they have had enough time, check their answers, and go through the method again.
- Give the learners a 4-digit by 1-digit multiplication problem to work out together in their groups. After enough time, discuss their methods. Some of the learners will hopefully be able to use the “new” method.

Problem Solving (15 minutes)

- Find problems in textbooks or make a worksheet entailing multiplication of 4-digit by 3-digit numbers. The learners can work alone to solve the problems. Do not be prescriptive about the method they use, but encourage them to try the column method. Work with small groups of learners to help them refine their multiplication methods.

Consolidation (15 minutes)

- Give the learners 5 to 10 multiplication exercises to do. They can finish these for homework.

ASSESSMENT	**Informal:** Observe the learners as they work to see if they are refining their multiplication methods.

WEEK 3: Day 2

Notes to the teacher:

- In today's lesson, learners will solve problems which require dividing 4-digit by 3-digit numbers.
- To make this a practical, meaningful concept, the focus will be on dividing by numbers such as 125, 150, 200, and 250 and will entail basic converting and using different SI units which are familiar to the learners.
- Division is repeated subtraction. Learners will use this fact to divide, but must try to subtract as large a number as possible each time.
- Division is the inverse (opposite) of multiplication. It is not commutative, i.e. 24÷2≠(does not equal) 2÷24.

Resources: Chalkboard, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do counting in multiples of 3-digit numbers. This can be done individually round the class, in groups, all the boys or all the girls.
  - Count backwards in 100s from 8 900 to 7 200.
  - Count forwards in 200s from 800 to 4 200
  - Count in 250s from 0 to 2 000
  - Count in 125s from 250 to 1 500 (This might be difficult, but the purpose is to let learners realize that 125 is half of 250)
  - Count in 150s from 450 to 1 500
  - Count backwards in 300s from 3 000 to 1 200

Concept Development (25 minutes)

- Give learners the following problem to solve in their groups. *I have 9 litres of energy drink. I pour it into 250 ml containers for a squad of soccer players. How many containers can I fill?*
  - Walk around and check that the learners remember that there are 1 000 ml in a litre. Therefore, 9 litres = 9 000 ml.
  - When the learners have finished, let each group which used a different method explain their methods to the class. Some groups might have counted backwards (used repeated subtraction): 9 000-250-250-250-250……..0. Using this method, although it will get the correct answer, is too long and not on a Grade 6 level. Another method that many will probably have used is:

    9 000-2 500=6 500 (x10)
    6 500-2 500=4 000 (x10)
    4 000-2 500=1 500 (x10)
    1 500-5 00=1 000 (x2)
    1 000-1 000=0 (x4) 10+10+10+2+4=36 containers

  Some groups will hopefully have worked out that 250**x4**=1 000. 1 000**x9**=9 000. 4x9=36 containers. This is the quickest. However, all methods must be accepted if the learners get the correct answer and do not take too long to do so.

- Give the learners another, similar problem to solve. Sit with any group which used a lengthy method for the previous problem to help them refine their method. An example problem: *The baker has 8 kilograms of flour. He uses 200g to bake one loaf of bread. How many loaves can he bake with 8kg?*
- The quickest way would be to work out that 200x**5**=1 000. 1 000x**8**=8 000. 8x5=40 loaves.
- With the help of the learners, write some multiples of some of the numbers which will be used as divisors in today's problems. Encourage the learners to always write down multiples of the divisor before they start a division exercise. They can work out the multiples by doubling, halving etc.

	250	**125**	**300**	**150**	**200**
x2 (double)	500	250	600	300	400
x4 (double number above)	1 000	500	1 200	600	800
x10	2 500	1 250	3 000	1 500	2 000
x5 (halve the number above)	1 250	625	1 500	750	1 000
x20 (double x10)	5 000	2 500	6 000	3 000	4 000

Problem Solving (25 minutes)

- Give the learners problems to work out, individually in their workbooks. Do not limit these to the above divisors; give the learners some more challenging problems to do as well. Work with the learners who are not using methods appropriate for Grade 6 to help them. Examples of problems you could use:
  - The Coke machine makes 8 litres 500 ml of Coke at a time. How many:
    a) 500 ml bottles of Coke can be filled from the machine?
    b) 200 ml cans of Coke can be filled from the machine?
  - The school tuckshop buys Smarties in bulk. They come in packets of 7kg. How many boxes of 125g can be filled from the big packet?
  - The school's cross-country race is over a distance of 7km500m. There are drinks available at tables every 300m. How many drinks tables are there?
  - The Western Cape has to erect telephone poles. They have 9 250 poles. A truck can transport 125 poles at a time. How many trucks will be needed to transport all the poles?
  - A farmer donated 5 litres of milk to the school. The teachers pour it into cups of 200 ml each. How many cups could they fill?
  - 4 560 Cameroon soccer supporters are going to the World Cup Soccer. They come in aeroplanes which carry 380 people at a time. How many aeroplanes will be needed to transport all the players?

ASSESSMENT	**Informal:** Check the learners' workbooks to see if they are applying their knowledge of multiplication to solve problems which entail multiplication. Take note of which learners are not using a quick method and spend time with them.

WEEK 3: Day 3

Notes to the teacher:

- The calculator is an important aid to people in their daily lives. It saves us time when working out things like how much money we have in the bank, how much our accounts come to, and in many other ways.
- It is important that learners know how to get the maximum use out of their calculators. However, they must always estimate their answer, as pressing the wrong key can result in an incorrect answer.
- Calculators differ in some respects, e.g. the constant function. Learners will have to experiment a bit if you use the constant function.

Resources: Chalkboard, textbooks, worksheets, calculators.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise and drill the 9x table.
  - Firstly, do this orally. You can gave groups of learners or individual learners saying the 9x table (backwards, too).
  - Teach the learners the trick with the 9x table: If you add the digits of the answers, they will always equal 9. For example, 4x9=**36. 3+6**=9. This is true of any multiple of 9.
  - Write the first 10 multiples of 9 on the board. See if the learners can tell you the pattern. The digit in the 10s place increases by 1 each time, and the digit in the units place decreases by 1 each time.
  - Do Clock Multiplication (see Addendum).
  - Give the learners a written task. Write a random list of 3-digit numbers on the board and ask them to write down which ones are multiples of 9 by adding the digits which make up the numbers: 126 is a multiple of 9 because 1+2+6=9. 154 is not a multiple of 9 because $1+5+4 \neq 9$

Concept Development (20 minutes)

- The learners must have their calculators on their desks. Draw a simple one on the board. Ask the learners to look at their calculators. They can compare them with their friends' calculators, seeing that there are mostly the same keys but they might be placed differently.
  - Let learners take turns to tell you what keys they see on their calculator. They can tell you where to fill them in on the calculator you drew on the board. Notice how the numbers 1 – 9 are positioned. 1 – 3 are always on the bottom row. This is different from a telephone key pad.
  - Tell the learners to enter the following on their calculators: 6.2 x 6.2 = + 0.23 = ÷ 50 =. Turn the calculator around to read the numbers on the display screen upside down: the calculator has said "hello".

- Investigate how to correct some errors when entering numbers.
  - Start with the C or CE. This is useful if you enter an incorrect number. You do not have to start at the beginning of the sequence again.The C or CE key deletes the last entry you made (as long as you have not pushed =). Write e.g. 4+5+9+3+6= on the board. The learners can work out the answer on the calculator. It is 27. Now make an error – tell the learners what to punch in: 4+5+9+*4 CE 3*+6= 27. Immediately you enter an incorrect number, press the C or CE key followed by the correct key and continue. Practise this with a few more sequences.
  - Sometimes we press the incorrect operation key. 100+45=145. By mistake we enter 100x. We do not have to clear everything and start all over. What we do is press the correct (+) key directly after pressing the incorrect key. Try this with the learners: 100 *x +* 45 = 145.
- Getting to know how to use the constant function on the calculator.
  - Calculators differ slightly in their constant function, so learners will have to experiment a little.
  - Using the constant key to add the same number repeatedly: For example, you want to add 4 repeatedly. This is also a good way to check on multiples of a number. Use one of the following sequences, depending on the calculator (write these on the board and let the learners see which one works on their calculator);

    4 + + = = = = =

    4 + = = = = =

    4 + 4 = = = = =

    2 + + 2 = = = = =

  Once the learners know how to use the constant function on their own calculators, ask them if they notice they are finding multiples. Ask them to use their calculators to see if, e.g. 119 is a multiple of 19. 17 ++ = (34) = (51) = (68) = (85) = (102) = (119). Yes, 119 is a multiple of 17. Give them a few more examples to practise using the constant function.

Assessment (30 minutes)

- Give the learners examples such as the following to assess their ability to use the calculator:
  - Is 130 a multiple of 32? Write down what you entered into your calculator to work this out. (Give 2 examples such as this)
  - Use your calculator to find the first 5 multiples of: 57; 29; 76. Write these multiples down.
  - Joseph entered the following into his calculator: 125 + 118 + 107 + 133 + 152 + 12. As he entered the 12, he realized he should have entered 142. Write down how he could have corrected this without entering all the numbers again. (Give a few examples like this; include some where the incorrect operation sign was entered).

• Give the learners about 4 problems to solve using different operations which they have learnt this term. Encourage learners to use the column method. They can first do the problems without the calculator, showing their working. They can then check using their calculators, but must write down what they entered into the calculator. Examples: - I had R4 567 in the bank. I spent R3 828. How much money do I have left? - There are three gates into the soccer stadium. 8 435 people went in through Gate 1, 6 258 people went in through Gate 2 and 12 659 people went in through Gate 3. Estimate, by rounding off, then calculate accurately, how many people went into the soccer stadium. Check on your calculator. - 5 865 people visited Robben Island yesterday. The ferry takes 345 people each time. How many times did the ferry cross to Robben Island? - Every day (including the weekends), Aunt Millie and her team bakes 2 155 pies. How many pies do they bake in a week?	
ASSESSMENT	**Formal, recorded Assessment Task 1:** • LO 1 AS 10e. Using a calculator to perform calculations.

WEEK 3: Day 4

Notes to the teacher:

- Learners are required to be able to convert between appropriate SI units for Assessment Tasks this term. Length and Temperature will form part of AT1 and AT2 this term. Mass and Capacity will be taught later this term as part of Term 3 Assessment Tasks.
- Today's lesson will begin with the smaller units of measuring length, i.e. the metre (m), centimetre (cm) and millimetre (mm). These units are more concrete to the learners than the more abstract kilometre (km) which will be taught later this term.
- The learners must know and use the correct abbreviations. These must be used regularly throughout lessons dealing with length.
- Conversion between and problem solving involving SI units was learnt in Grade 5, but do not presume that the learners have prior knowledge. It is worth the time to go back to the beginning.
- The next few lessons integrate with NS and Technology.

Resources: Measuring tapes, rulers, metre stick, trundle wheel, chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Multiplying by 10, 100 and 1 000. Give the learners a table with 10 or more rows to complete. This is an example with three rows:

Number	X10	X100	X1 000
7			
32			
451			

  - Afterwards, go through the answers with the learners (they can swop books and mark each other's work). See if they can tell you the pattern or rule they observed.

Concept Development (20 minutes)

- Ask two or three learners to measure how wide the classroom is. They can use any parts of their bodies to do so. They might use their feet, placing one foot directly behind the other and crossing the room. They might use long strides. They might use their hand spans. At the end, they will all come up with different "measures".
  - Discuss with the class the inaccuracy of measuring in this way. Ask what we use to measure accurately. We use a tape measure and we measure in metres.
  - Show the learners the metre stick (or draw a line on the board that is a metre long). How could we use our bodies to approximately measure a metre? We can hold our left arm out sideways. The distance from our right shoulder to the fingertips of our left hand is about a metre. A metre is also about the length of a long stride.
  - Tell the learners that the metre is the chief of the measuring tribe or clan, or the king of the measuring kingdom. He has helpers that are smaller than him. What are they?

- The centimetre is one of them. How many centimetres are equal to a metre? 100. Ask the learners if they know any other words with the prefix “cent” to help them remember 100? There are 100 cents in a Rand. A cm is about the width of a finger.
- The other one is the millimetre. It is very tiny. Let the learners look on their rulers, then tell you how many millimetres in a centimetre. There are 10. Let them work out how many mm in a metre – it is 10 (in a cm) x100 (cm in a metre) =1 000mm in a metre.
- Tell the learners to take out their rulers. They will see that the one edge is marked in mm with a thick line every 10mm. That 10mm mark is equal to 1 centimetre. Using that edge of the ruler let all the learners find 14mm. Ask them how many cm and mm that is. It is 1cm and 4mm. Repeat with different numbers of millimetres.
- Let two learners of different heights come to the front of the class. Ask different learners to estimate how tall these two learners are (another word for how tall is *height*). Measure their heights and let a learner from each group come and see the tape measure so they know how to read it and help their groups.
- Make sure the learners know the meanings of the words height, width and length.

Consolidation (30 minutes)

- Let the learners now measure *15 or more* items within your classroom and school and fill in a table such as the one below. Make sure the items to be measured are not all measured in the same unit. They will need to work in groups or pairs, but each learner must complete the table in his or her own workbook. Walk around and check that learners are all participating and contributing to their groups. Ensure that they know how to use the tape measures, rulers and trundle wheels to measure accurately.

ITEM	THE UNITS OF MEASUREMENT WE MUST USE	ESTIMATE	ACTUAL
Width of desk			
Height of door			
Length of eraser			
Height of tallest person in our group			
Width of chalkboard			
Length of board duster			
Length of the corridor			

- The learners can complete examples, converting between mm and cm, in their workbooks. They can look at their rulers to help them. Give the learners about 5 examples converting from cm and mm to mm, and from mm to cm.
  - 9cm 4mm = ……..mm 52mm= ……cm……..mm

ASSESSMENT	**Informal :** Take note of the learners’ participation in class and in the measuring activities.

WEEK 3 : Day 5

Notes to the teacher:

- Today's lesson continues from yesterday's lesson. The focus will be on converting between the different units of length (a metre and smaller) and solving problems involving conversions.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do Running Maths using different skills like multiplying, adding, subtracting, doubling and halving. See Addendum (Mental strategies) for instructions.

Concept Development (20 minutes)

- Revise by questioning and answering how many mm in a cm, how many cm in a metre and how many mm in a metre. Write a summary on the board:

  10mm=1cm; 100cm=1m; 1 000mm=1m.

  - Tell the learners you have 2m 30 cm of material. You want to cut it into strips that are 10 cm wide. How many strips can you cut? Let them work this out in their groups. Afterwards discuss it with them. They must convert 2 m to centimetres. 2x100=200cm. Add the extra 30 makes 230 cm. How many strips of 10cm wide can we cut? 230÷10=23 strips.
  - Give them a conversion working the other way. I have 532cm of fabric. I need 1m to make a flag. How many flags can I make? We need to find out how many hundreds we have. Which digit is in the hundreds place? The 5. This means I have 5 hundreds. Write it on the board like this: 5/32. The rest we leave as centimetres. The final answer is that I can make 5 flags with 32cm left over. So 532cm=5m32cm.
  - Using question and answer technique, and the active participation of learners in converting from one unit to another, do four or five more examples with them.

Consolidation (15 minutes)

- Find examples in textbooks, make worksheets or write sums on the board for the learners to practise converting between units of length. Work with learners who are having difficulty converting between the different units of length. Be sure to include:
  - 8m230mm=……mm (Give at least 5)
  - 15m23cm= …….cm (Give at least 5)
  - 7 564mm= ……m……mm (Give at least 5)
  - 928cm= …….m……..cm (Give at least 5)

Problem Solving (15 minutes)

- Give the learners problems involving converting between the different units of length. Examples (you should be able to find suitable examples in textbooks):
  - Find the sum of 23m and 925 cm. Answer in m

- A sheet of A4 paper is 210mm wide. If I place 3 such sheets side by side so that their edges are touching, how many cm and mm wide will the 3 sheets be in total? - For sports day, we want to make rosettes. Each rosette needs 65cm of ribbon. How many metres and mm of ribbon must we buy to make 30 rosettes? - John is 8mm taller than Simon, who is 1m38cm tall. How tall is John in mm? How tall is he in cm?	
ASSESSMENT	**Informal :** Mark the learners' books to see how well they can convert between different units of length taught so far, and how well they can apply this knowledge to problem solving.

Grade 6: Week 4

Hours: 5	**Number of Periods: 5**
Mathematics LO 2 AS 1a, 1b **LO 4 AS 4c, 6b**	**Milestones:** • Investigate and extend numeric and geometric patterns looking for a general rule or relationships represented in physical or diagrammatic form and not limited to sequences involving constant difference or ratio. • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for Length (millimetres, centimetres, metres and kilometres) • Use of appropriate measuring instruments to appropriate levels of precision including rulers, meter sticks, tape measures and trundle wheels to measure length

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:	Measurement: Length (m and km)	Number patterns	Number patterns	Revision: Place value, rounding off, addition, subtraction, multiplication, division – all work done this term	Assessment Task 1
Resources	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets, matches or toothpicks.	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets Mental Assessment Task	Prepared Assessment Task

WEEK 4: Day 1

Notes to the teacher:

- The learners should by now be able to convert between mm, cm and m. Today the focus will be on converting between metres and kilometres.
- This concept is a bit more abstract as it is difficult for the learners to actually see a kilometre.

Resources: Chalkboard, worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Adding to make 1 000. Give the learners sums to complete in their groups. See which group finishes first and has their answers correct. Give examples such as:
  - 248+□=1 000 (Give 10 or more)
  - Choose which pair of numbers total 1 000: 425; 820; 675; 575; 170. (Give 10 or more)

Concept Development (20 minutes)

- Briefly revise the units of measuring length that have been learnt so far and the relationship between the units. Remind the learners that the chief of the Length clan is the Metre, and the units of measurement they have learnt so far are all smaller than him. However, there is another helper. This one is too big to come inside, so he is responsible for measuring long distances outside. It is the kilometre.
  - Ask the learners how many metres in a kilometre. Think of a place near your school that is approximately a kilometre away that they can visualize how far a kilometre is.
  - In groups, give learners a list such as the following to estimate the distance in km. This list will have to be adapted to your particular environment. It should include about 10 distances to estimate. Discuss the answers with the learners when all the groups have finished.

	Estimate in kilometres
From school to the closest shop	
From Boksburg to Benoni	
Comrades marathon	
The thickness of earth's atmosphere	

- Discuss Athletics with the learners. Ask them to name some distances that are run. As they tell you the distances, write them on the board. Build up a complete list, in random order, which comprises the following: 5 000m; 1 500m; 42km 195m (marathon); 800m; 21km (half marathon); 10 000m; 3 000m (steeplechase).

- Ask the learners in their groups to convert the above distances to km and m, and arrange them in ascending (from shortest to longest) order. Walk around and see what they are doing. Although you have not shown them how to convert, see if they can apply their knowledge from converting mm, cm and m to this task.
- After the learners have finished, let each group have a turn to give an answer and explain how they worked out the conversion. For example, the shortest distance is 800m. There is no digit in the thousands place, so there are 0 kilometres. 800m = 0km 800m. (Another way of thinking is that 800 is less than 1 000, so there are no whole kilometres).
- Do some conversions with the learners. Let individual learners come and write the answers on the board and earn points for their groups if they obtain the correct answer. Do some conversions from m to km and m, e.g. 4 325m = …….km……..m and some from km and m to m, e.g. 18km 456m = ……..m

Problem Solving (15 minutes)

- Find problems involving converting between m and km in textbooks, or make your own. Learners must complete these on their own in their workbooks. Give them about 5 problems. Examples:
  - A triathlon consists of a 1km 500m swim, a 40km cycle ride and a 10km run. How many metres does an athlete cover altogether in a triathlon?
  - Mary's house is 700m from school. How many km does she walk in a school week if she walks to and from school each day?
  - Zola Decker was competing in the 5km race. She tripped and fell 850 m before the end of the race. How many km and m had she run?
  - My friend and I went on a picnic. We cycled 4km to the nature reserve, then walked 1 345m to the waterfall where we had our picnic. How many metres did we go from our home to the waterfall and back? How many km and m is this?

Consolidation (15 minutes)

- Give the learners exercises to complete in their workbooks. Examples:
  - 3 456m = ……km …..m (Give them at least 5)
  - 4km 8m = ……..m (Give them at least 5)
  - 8km+256m = ……..m (Give 2 or 3)
  - 5km-560m = …….m (Give 2 or 3)

ASSESSMENT	**Informal :** Check the learners' books and oral participation to gauge which learners grasp this concept and which learners are still struggling.

WEEK 4: Day 2

Notes to the teacher:

- The focus of today's lesson is on number patterns. Learners must be able to extend patterns, and describe the relationship in words.
- Working with number and geometric patterns is not new to the learners. Some learners have difficulty extending patterns and describing them. There is no rule to give these learners. You can only guide them with different techniques to help them.

Resources: Chalkboard, textbook, worksheets, matchsticks or toothpicks.

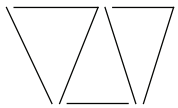
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners written work to do. Give them about 20 exercises with the operation sign missing. They must fill in the correct operation sign. Examples:
  - 48□16=3 (Answer ÷)
  - 54□9=45
  - 6□12=72

Concept Development (25 minutes)

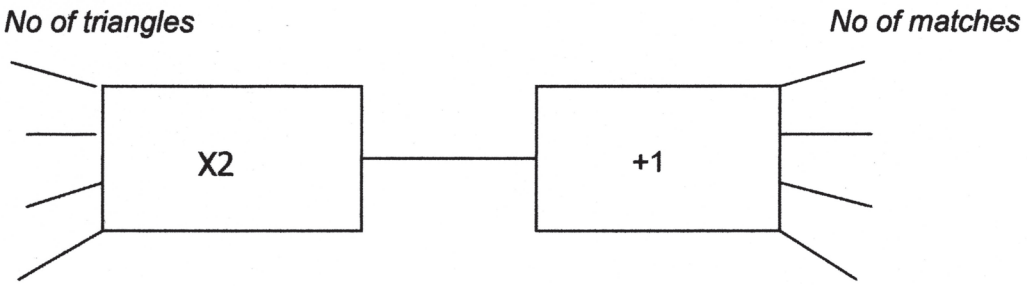
- Give each group of learners some matchsticks. Ask them to build a row of three triangles such as this: (Draw this on the board.)



  - Ask them how many matches were needed to complete the second triangle (2). Ask them how many more matches were needed to complete the third triangle (2). Let the learners add another triangle, and again ask how many more matches they needed:

  - Ask the learners if we can conclude that we need 2 matches to build every triangle. We can, but to close the last (or first) triangle, we need an extra match:

- If we need to make a pattern of 100 triangles, it is not practical to sit and make all those triangles, so we need to establish a rule. Ask the learners if they can think of a rule. It is (number of trianglesx2)+1. So to make a pattern of 100 triangles, we work out how many matches we need like this: (100x2)+1=201.
- We can use a flow chart (also called a spider diagram or spidergram) to calculate how many matches we need to make a given number of triangles. Draw one on the board, write down random numbers of triangles and work out the number of matches needed.



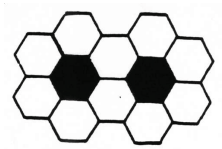
- We can also show this rule by means of a table. Draw one on the board and complete it with the learners :

No. of triangles	1	2	5	40	75
No. of matches	3				

- Repeat the above with another shape, e.g. squares or hexagons.

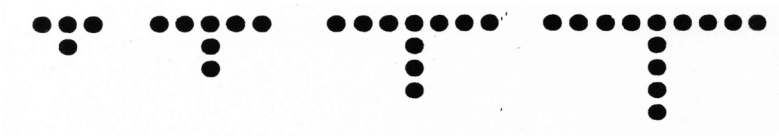
Investigation (25 minutes)

- Give the learners two to three diagrams. They must find the rule, write a flow chart for the rule and do a table to calculate the rule. You can use matchstick shapes as well. Examples:
  - The shaded part in the diagram below represents flower beds. The municipality wants to lay hexagonal paving stones around each flower bed. Using a flow chart and table, work out how many paving stones the municipality will need to pave around: 2 flower beds, 8 flower beds, 16 flower beds and 32 flower beds. Write down the rule (also called a formula).



Rule: x4+2

  - Jacob is making patterns using marbles such as the one below. Show by means of a flow chart and a table, how many marbles he will use for the 6th pattern, the 11th pattern, the 41st pattern and the 100th pattern. Write down the rule for this pattern.



Rule: x3+1

- Learners can complete this work for homework if they do not finish in class.

ASSESSMENT	**Informal :** Observe which learners can work well with number patterns and guide those who are still having difficulty.

WEEK 4: Day 3

Notes to the teacher:

- Number patterns are useful in Maths as they enable learners to predict outcomes. They also lay the foundation for solving algebraic problems in high school.
- Today's lesson focuses on finding a pattern in tabular form. It is important that the learners see the relationship vertically in a table, i.e. the learners must ask themselves, "What have I done to the top number to get to the bottom number?"

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some Running Maths (see Addendum) using different operations.
- Do some written doubling and halving (include uneven numbers). Give the learners a table with 10 rows to complete. The following is an example with three rows. See who is finished first. Afterwards, let the learners swop books and mark each other's work.

Number	Double	Halve
584		
795		
1 258		

Concept Development (20 minutes)

- Write the following table on the board:

x	1	2	3	8	12	15
y	4	5	6			

- Tell the learners to look at what you have written. Do not worry about the x and y at this stage. In the first column we have a 1, under it is a 4. What can we do to 1 to get 4? 4 is larger than 1, so we can basically either add or multiply. Try to add: 1**+3**=4. Now multiply: 1**x4**=4. The rule or pattern has to be the same for all the numbers on the table, so we must test by using these two operations on the next column. 2**+3**=5. 2**x4**=8. The number in the second row, under the 2, is 5. It seems that **+3** is our rule. Test this in the third column: Does 3**+3**=6? Yes it does, so we can be sure that our rule is **+3**.
- With the learners' help, fill in the rest of the table, applying the rule:

x	1	2	3	8	12	15
y	4	5	6	**11**	**15**	**18**

- Now deal with the x and y. We use these letters to represent any number and write a general rule. We said our rule was the top number (x) +3 = the bottom number (y).

- Therefore our rule is: x+3=y

x	1	2	3	8	12	15
y=x+3	4	5	6	**11**	**15**	**18**

- Write the following tables on the board, and let the learners in their groups find the patterns and the rules. They must then fill in the missing numbers. Walk around and guide the groups.

x	1	2	3	6	8	32
y	7	14	21			

x	5	7	9	11	23	89
y	0	2	4			

x	3	6	15	24	36	72
y	1	2	5			

- After enough time, let members of different groups come and write the missing numbers in the blocks. Check the rules that they established for each table and that they wrote the rules correctly using x and y. The first rule is: y=x**x7** (The correct way to write this is: y=7x); the second rule is y=x**-5**; the third rule is y=x÷**3.**

- From a given rule, learners must now fill in their own tables. Write 2-3 examples such as the following on the board and let learners in their groups draw and complete a table:
  - Find the missing values of x if y=(x+4)x3. Remind the learners to work out what is in brackets first.

x	5	9	13	42	100
y					

  - Let a different learners from different groups come up and write the completed tables on the board.

Consolidation (15 minutes)

- Give learners practice in today's work. Give them examples to do individually in their workbooks of: filling in a table where the first 3 to 4 x-values are completed; using a rule to complete a table for different values of x. Give them about 3 of each.

Problem Solving (15 minutes)

- Give the learners about 3 problems to solve using a table. Instead of x and y, we have "headings". Example:
  - Farmer Joe packs a dozen eggs into a box in a minute. Fill in the following table:

Minutes	3	5	10	15	20
Eggs packed into boxes					

  - Mr Brick the Builder pays his labourers R105 a day. Use a table to work out how much he will have to pay: 2 labourers, 5 labourers, 10 labourers, 15 labourers and 17 labourers for a day.

ASSESSMENT	**Informal:** Observe which learners have can complete the work without difficulty. Hep the learners who are struggling.

WEEK 4: Day 4

Notes to the teacher:

- Today's lesson will be revision of all the concepts taught so far this term. This is in preparation for tomorrow's Assessment Task 1.
- You must decide which concepts, from your informal assessment over the past few weeks, need more practice and revision.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a mental test as part of Assessment Task 1. They must write down the answers only.
  - Ask 10 questions using addition, subtraction and multiplication (up to 12x12) orally. The learners must write down the answers as you ask the question. Give them enough, but not too much, time for each answer. Ask these as simple problems, such as: *My brother is 12 years old. My grandfather is 6 times his age. How old is my grandfather?*
  - Write 10 questions on the board using the three operations. Include addition and subtraction of at least 2-digit numbers and multiplication up to 12x12. Try to ask these questions in a variety of ways, e.g.:
    a) 56+☐=85
    b) 108÷12=☐
    c) 7x8=☐
    d) Write down the number that is 38 more than/less than 57.

Revision (50 minutes)

- Find examples in textbooks, have prepared worksheets and/or write a variety of exercises and problems on the board to practise. If possible, give different learners different work to practise the concepts which they are not too sure of. Learners can work in groups in which stronger learners can assist the weaker learners. Include as many of the topics covered this term as possible:
  - Place value up to 7-digits
  - Adding and subtracting
  - Multiplying (4-digit by 1-digit numbers) and
  - Dividing (4-digit by 3-digit numbers)
  - Compensating and rounding off
  - Equivalent fractions with 1-digit denominators
  - Measurement - Temperature and length
  - Number patterns
  - Enlarging and reducing shapes

ASSESSMENT	**Informal:** This lesson provides a good opportunity for you to see the gaps in your learners' knowledge and to help learners who have these gaps.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO1 AS 9a, 9b,: . Mental calculations involving addition and subtraction, multiplication of whole numbers to 12x12.

WEEK 4 : Day 5	
Notes to the teacher: • Today's lesson will be used for Assessment Task 1. • This must be completed without any help from you. • Learners may not be used to writing one big test for the Assessment Task, but they are at the stage of their school career when they can write tests in preparation for Grade 7 and high school. **Resources:** Prepared Assessment Task.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Do some times table drilling. Use "Clock Multiplication" (see Addendum). **Assessment Task** (50 minutes) • Learners must write the Assessment Task on their own in their workbooks (or on paper to be pasted into their workbooks). Check the Assessment Task block below to ensure that you have assessed everything that is required for Assessment Task 1. Read the requirements carefully and ensure that you include problem solving where it is required. • Try not to let this become a big event. Rather treat it more as an exercise than as an examination. We do not want to introduce exam anxiety at this or any other stage.	
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 5a: Equivalent fractions with 1-digit denominators. • LO 1 AS 1: Solve problems in context such as measurements in Natural Science and Technology. • LO 1 AS 8b, d, e: Estimate and calculate by selecting and using operations appropriate to solve problems that involve - Addition and subtraction of whole numbers - Multiplication of at least 4-digit by 1-digit numbers - Division of at least 4-digit by 3-digit numbers • LO 1 AS 10c,d: Use a range of techniques to perform written and mental calculations with whole numbers including: - Building up and breaking down numbers - Rounding off and compensating. • LO 2 AS 1b: Investigate and extend numeric and geometric patterns looking for a general rule or relationships not limited to sequences involving constant difference or ratio. • LO 3 AS 5: Draw enlargements and reductions of 2-dimensional shapes using grid paper • LO 4 AS 5: Solve problems involving selecting, calculating with and converting between appropriate SI units of Length and Temperature.

Grade 6: Week 5

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 8c **LO 4 AS 1, 2**	**Milestones:** • Estimate and calculate by selecting and using operations appropriate 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) • Read, tell and write analogue, digital and 24-hour time to at least the nearest minute and second. • Solve problems involving conversion between appropriate time units including time zones and differences.

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:	Reading analogue and digital time and converting between the two.	Converting analogue and digital time to 24-hour time	Time zones	Converting between Improper Fractions and Mixed Numbers	Adding Mixed numbers
Resources	Chalkboard, textbooks, worksheets, clocks or drawings of clocks, stopwatches	Chalkboard, textbooks, worksheets, clocks or drawings of clocks, flight schedule or similar	World map showing time zones	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets

WEEK 5: Day 1

Notes to the teacher:

- Today's lesson focuses on reading analogue and digital time.
- The learners learnt to read analogue and digital time in Grade 5, but it is worth the time to start at the basics to ensure that all the learners are able to read the time.
- Revise the abbreviations for hours (h) and minutes (min)

Resources: Chalkboard, textbooks, worksheets, analogue clock, stopwatch

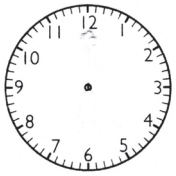
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a counting activity. Going round the class, learners can count forwards or backwards, depending on your instruction, from the previous learner. Do not always start at zero. Examples:
  - Count forwards in quarters from $3\frac{1}{2}$
  - Count backwards in 60s from 480 to zero
  - Count forwards in 15s from 75 to 225
- Do a written activity of number bonds to 60 and taking away multiples of 60 (in preparation for minutes, seconds and hours). They can do these individually in their workbooks. After the learners have finished the work, they can swop books and mark each other's work. Examples:
  - 48+□=60 (give the learners about 8 of these)
  - How many 60s in: 180, 300, 720. (Give the learners about 10 of these)
  - How many 60s, and how much left over, in: 135, 400, 160 (Give about 10)

Concept Development (25 minutes)

- If you do not have an analogue clock that is large enough for the whole class to see, draw



a large clock face (with minute divisions) on the board. Discuss the clock face with the learners, asking questions such as what the long hand points to (minutes), what the short hand points to (hours), how many minutes are in an hour. Tell the learners that when you say, "Close your eyes," they must do so. When they think their eyes have been closed for a minute, they must put up their hands. See how many of them can accurately estimate a minute. Use the stopwatch to time a minute. They can all open their eyes when you tell them a minute has passed.

- Divide the learners into two or three teams. Ask a variety of questions about telling the time on an analogue clock, making sure each learner gets a chance to answer, and each team has the same number of questions to answer. Keep score and see which team wins. Start with fairly easy questions then move onto more difficult questions. Examples:
- Move the hands of the clock (or draw them on the board) to show different times – start at 15 minute intervals, then go on to 5 minute intervals. The learners must say the time e.g. quarter past 5, 10 to 8.
- Do the same, but now go to minute intervals, e.g. 3 minutes past 5, 17 minutes to 4.
- Give the learners analogue times, and let learners take turns to come and draw the hands on the clock face on the board or move the hands on the actual clock. Give times such as 4 minutes past 6, 13 minutes to 8.
- Give the learners digital times, e.g. 4.45, 8.22, and repeat the above.
- Add up the scores and see which team won. Give them some sort of reward (a sweet each or let them go out to break 2 minutes early).

• Tell the learners that in the competition they just had, you used different ways of saying the time.

- Check that they know: when we say quarter past 4, we are saying the analogue time. The clock face with hands and minute divisions is an analogue clock. The other way we say the time, e.g. 5.15, is called digital time. We write normal (not 24-hour) digital time with only a single digit for the hours (for hours before 10), then a full stop to separate the hours from the minutes. Examples: 2.30; 6.18; 10.20; 3.00; 11.45
- Revise what a.m. and p.m. times mean: a.m. is *ante meridiem* which is 'before middle of the day' i.e. from midnight to noon; and p.m. is *post meridiem* i.e. 'after middle of the day', i.e. after noon until midnight.
- In their groups, give the learners the following problem to work out. *I wake up at 5.54 a.m. School starts at 8.10 a.m. How much time has passed from the time I wake up until the start of school?*
- Let each group give you their answers and discuss how they worked out the answer. Their thinking will probably go like this:

  5.54 → 6.00 = 6 minutes

  6.00 → 8.00 = 2 hours

  8.00 → 8.10 = 10 minutes

  2h+6min+10min=<u>2h16min</u>
- Give them another similar problem to solve in their groups and discuss their methods to arrive at the answer.

Consolidation and problem Solving (25 minutes) • Give the learners work to complete in their workbooks. Do not include anything about 24-hour time; this will be covered in the next lesson. Work with groups of learners who are still unsure of this work while others continue. Include a few examples of each of the following for practice: - Filling in hands on clock faces to show different times - Writing analogue and digital time from times shown on clock faces. - Writing in a.m. or p.m. times. For example, we eat breakfast at 7 a.m./p.m.. We finish school at 2 a.m./p.m. - How much time has passed between two different times (hours and minutes)	
ASSESSMENT	**Informal:** Ascertain from learners' participation in class and their written work whether they are competent in reading analogue and digital time.

WEEK 5: Day 2

Notes to the teacher:

- Today's lesson continues from yesterday's lesson but will include converting to 24-hour time. This is also called International Time.
- Some learners have difficulty with this concept. Work with those learners who have trouble, as 24-hour time is important in our lives. Aeroplane, bus, train and television schedules are often given in 24-hour time.
- 24-hour time is written with two digits for the hours. The minutes are separated from the hours with a colon. 8.15 a.m. is written 08:15.

Resources: Chalkboard, textbooks, worksheets, train or aeroplane schedule.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Play Tables King. See Addendum for instructions.
- Give the learners a Speed test with 20 multiplication examples. You can write this on the board, learners must write down the answers as quickly as possible. Cover the questions until all the learners are ready to start.

Concept Development (20 minutes)

- Draw a clock face showing 5.57 (3 minutes to 6) on the board. Tell the class that Mr Naidoo arrived at the station to catch a train home after work, and he saw that time displayed on the clock on the platform. He checked the train schedule (write this on the board) to go to his home in Athlone:

Train number	Departs Platform 5
1026	17:35
1031	17:58
1040	18:17

- In their groups, let the learners discuss the following (write the questions on the board, or have a printed copy per group): which train has already left the station; which train will Mr Naidoo be able to catch; in how many minutes will the train depart; if he misses that train, how long will he have to wait for the next train.
- Go through the questions with the learners. (Some of them will probably have forgotten 24-hour time and not have had a clue what the schedule meant. Do not worry if they have forgotten, they will know it by the end of the lesson.)

- Ask the learners why the time is written 17:35. It is written in 24-hour time. Using question and answer techniques, establish: that there are 24 hours in a day; when telling the time this way, the day starts at midnight (00:00) and we count in hours until we get to the end of the day, midnight again; if the numbers showing the hours are greater than 12, it is p.m., and if they are smaller than 12, it is a.m.
- To convert it to digital time, we subtract 12 from the hours (5). The minutes, written after the colon, stay the same. So 17:35 is 5.35 p.m.
- Ask learners to convert the other two times on the train schedule to digital time.

• Make sure the learners know how to say 24-hour time correctly. Write 24-hour times on the board and let the learners say them correctly. Examples:
  - 01:00 "zero one hundred hours"
    02:00 "zero two hundred hours"
    11:00 "eleven hundred hours"
    23:00 "23 hundred hours"
    08:15 "zero eight fifteen"
  - Practise converting between digital time and 24-hour time orally. Do as many examples as are necessary for the majority of the learners in the class to understand.

Problem Solving (15 minutes)

• Give all the learners a copy of the following flight schedule for flights from Durban to Johannesburg.

Departure	Arrival	Flight no.
06:00	07:10	SA0527
06:55	08:05	SA0531
10:55	12:10	SA0547
12:10	13:20	SA0551
12:55	14:05	SA0555
13:55	15:10	SA0559
15:55	17:05	SA0565
16:55	18:05	SA0571
17:55	19:05	SA0575
20:10	21:20	SA0581
21:00	22:10	SA0585

  - Learners who understand 24-hour time can work on their own while you work with groups of learners who do not fully understand. Give them questions related to the schedule such as:
    a) Write all the afternoon departure times from Durban in analogue time.
    b) Which flight is the soonest after midday? What time is it?
    c) How long does Flight SA0559 take to get from Durban to Johannesburg?

d) If a businessman has to be at a meeting at 3 p.m., which flight should he take and what time does that flight arrive?
e) Flight SA0551 departed 27 minutes late. What time did it leave Durban?
f) I am traveling on Flight SA0571. I have to be at the airport 45 minutes before departure. What time must I be at the airport?
g) How many flights arrive in Johannesburg in the morning? What Flight numbers are they?
h) How many flights leave Durban before 1 p.m?

Consolidation (15 minutes)

- Give the learners work from their textbooks to convert from digital time to 24-hour time and vice versa. If there are no suitable exercises, give them a table such as the following to complete (the first one is done for you). Give them a table with at least 10 rows to complete.

Digital a.m.	Digital p.m.	24-hour	How we say it in 24-hour time	How we say it in analogue time
5.57		05:57	Zero five fifty seven	3 minutes to 6 (in the morning)
	6.32			
		21:05		
			Twenty three hundred	
	4.55			
				10 past 9 in the evening

ASSESSMENT	**Informal :** See from the learners' responses and how well they do their written work whether they can convert to 24-hour time and write it correctly.

WEEK 5: Day 3

Notes to the teacher:

- Leading on from an understanding of 24-hour time, this lesson focuses on the world's time zones.
- Because the world rotates on its orbit every 24 hours, there is a time difference between different parts of the world, depending on their longitude position.
- The Greenwich Meridian which runs through England is 0° Longitude. It is from this Line of Longitude that time is determined. Places to the east are ahead (+) and places to the west are behind (-), the number of hours varying according to their distance from the Greenwich Meridian.
- International time zones have become more important in recent years with the increase in movement (aeroplanes, people travelling) around the world, international business, and international sport shown on television, to give a few examples of its importance.
- The time in a particular place is called local time. Make sure the learners know this vocabulary.
- This lesson integrates with Geography and Science.

Resources: Chalkboard, textbooks, worksheets, tennis ball, torch, 8 small chalkboards and chalk or scrap paper, world map showing time zones (can be found in the front of telephone directory).

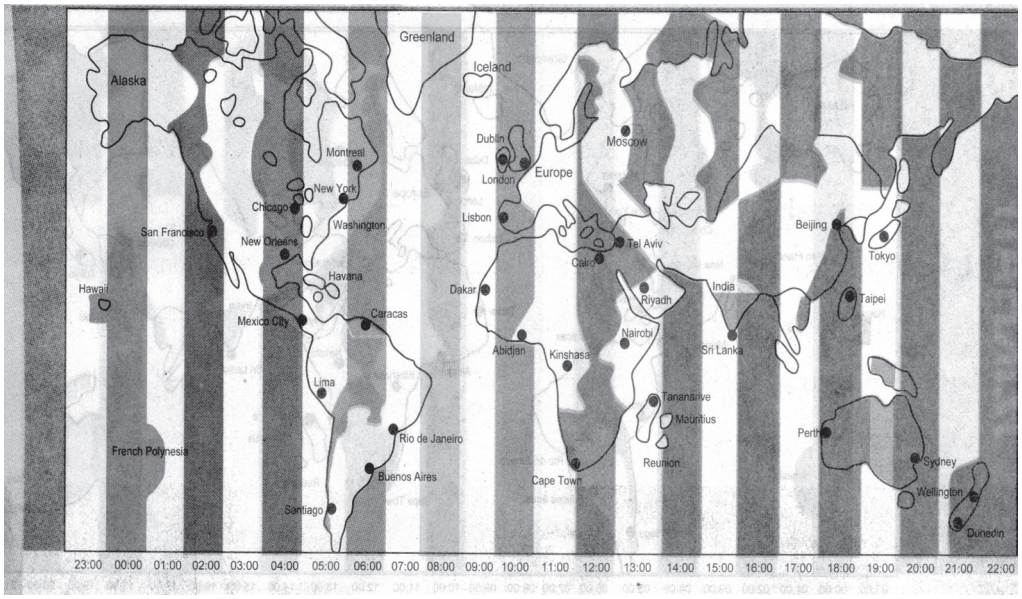
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practice adding 3-digit numbers. Do a few orally and let different learners answer. Then give 10 or more for the learners to write down the answers only. You can say each example and let the learners write down the answers, or you can write the examples on the board. The learners can work in pairs, groups (in which case they will have to whisper or other groups will hear their answers) or individually.

Concept Development (25 minutes)

- Using a tennis ball (or similar) and torch, ask if any of the learners can explain how we have day and night.
  - Once the learners understand how day and night occur, they will understand that there are time differences between different countries of the world. One part of the world is in darkness while another part is in light; some parts are experiencing dawn, while it is dusk for others. For the sake of convenience, scientists have clearly defined time zones, shown on a map as equal, vertical stripes. Hand the learners each a map, which can be found in the front of the telephone directory, such as the following.



- Let them find South Africa on the map, and see the time that is written there. (Note that this map shows South Africa at 12 noon. Most maps like this show the time zone through England as 0, and each time zone line to the west of it is -1, -2, -3 hours, etc, and the time zone lines to the east of it are +1, +2 hours, etc.)
- Ask them questions about the map, such as: How many time zones are there in Africa? If it is 12 noon in South Africa, what is the time in Perth? How many hours ahead of us is Perth? How many hours behind South Africa is England? Is North America ahead of or behind South Africa? What is the local time in Rio de Janeiro when it is 13:00 in England?
- Explain to the learners that scientists agreed that England is the starting point, the country "in the middle", of time zones. We count + hours to the east of England and – hours to the west of England.

• Divide the chalkboard into 8 columns, and at the top of the columns write the following:

-8	-5	0	+2	+4	+6	+8	+10
Western USA	Eastern USA	England	South Africa	Mauritius	India	Western Australia	Eastern Australia

- Choose 8 learners to come and stand at the front of the class, with their backs to the chalkboard. Each learner must stand in front of one of the above columns. They will represent 8 different time zones of the world. Give each learner a chalkboard and piece of chalk (or use scrap paper and pencils or crayons)
- Tell the learners representing the time zones, that it is 15:00 in England. Each one must write down the time (on their chalkboard) in the time zone he/she represents. This is their *local time*. The "time zone" learners will need to look at the board to calculate the time difference. (Western USA will write 07:00; Eastern USA will write 10:00; South Africa will write 17:00 etc). Other learners can see if the "time zone" learners are correct.

- Say another time, e.g. It is 10:15 in South Africa. The “time zone” learners must now write the time in their time zone. (This is called local time).
- Give learners turns to say different times in different time zones. Each time the “time zone” learners must calculate the time in their zone.
- Give 8 different learners a chance to stand at the front and be “time zone” learners and repeat the above.

Consolidation (25 minutes)

- Using the above map (or similar) give the learners time zone calculations to do such as:
  - The World Cup Soccer Opening Ceremony will be at 10:00 in South Africa. What time will people in Australia watch it on their TV’s?
  - My aunt is flying from London to Cape Town. Her flight arrives in Cape Town at 15:35. What time is that in London?
  - Buenos Aires soccer fans want to watch their team play against Italy in the World Cup Soccer tournament. This match is scheduled for 19:15 in South Africa. What time will it be televised in Buenos Aires?
  - If it is 15:20 in England, what time is it in: San Francisco (western USA), Sydney (eastern Australia) and Iceland?

ASSESSMENT	**Informal :** Walk around the clas while the learners are busy with their work and see that they understand time zones.

WEEK 5: Day 4

Notes to the teacher:

- Learners need to know how to add and subtract mixed numbers. However, before doing this, they need to understand what Mixed numbers and Improper fractions are.
- Make sure the learners understand that the line in a fraction which separates the numerator from the denominator is like a ÷sign. The numerator is being divided by the denominator.
- Mixed numbers and Improper fractions are another type of equivalent fractions. We seldom use Improper fractions in our daily lives. We use Mixed numbers.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

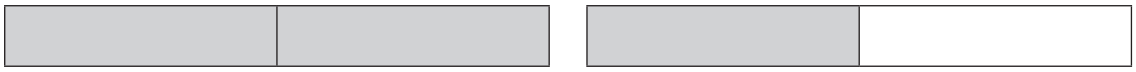
- Practise multiplication and division:
  - Use "Clock Multiplication" (See Addendum).
- Revise factors. In groups, the learners can find all the factors of 8 2-digit numbers, then circle factors that are common to different pairs of numbers. For examples, find all the factors of: 15; 24; 32; 81; 42; 48; 96; 75. Circle the factors that are common to: 15 and 48; 24 and 42, etc. Make it a competition and give the winning group a reward (e.g. 4 minutes extra break).

Concept Development (30 minutes)

- Draw a strip (to represent a chocolate, loaf of bread, pizza, apple or anything) on the board and ask the class what fraction is shaded. .

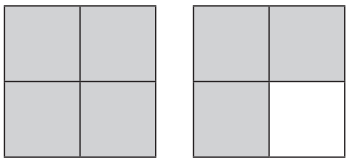
You have a whole (chocolate) and it is divided into halves. One half is shaded.

- Draw two strips on the board:

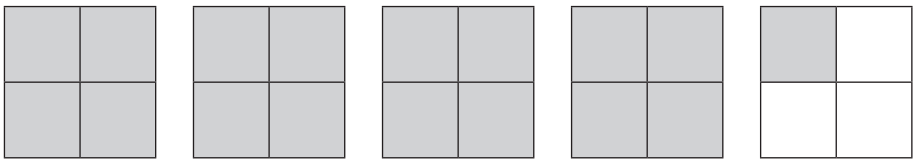


- Ask the learners what fraction is shaded now? Three halves. How do we write this as a fraction? $\frac{3}{2}$. This is called an Improper fraction. The numerator is larger than the denominator.
- Ask the learners if anyone can think of another way of saying this fraction? We say "one and a half". We write this $1\frac{1}{2}$. This is called a Mixed number – it has a whole number part (the 1) and a fraction part (the half).
- Check that the learners agree that $\frac{3}{2}=1\frac{1}{2}$. These are equivalent fractions.

- Repeat the above with quarters. Examples:

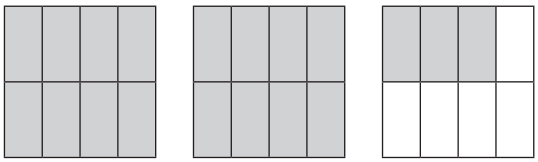


Ask the learners into what fraction is each "slice of bread" divided – quarters. How many quarters are shaded? 7. How do we write this as an improper fraction? $\frac{7}{4}$. What is this as a Mixed number? $1\frac{3}{4}$.



Ask again, how many quarters are shaded? 17. How do we write this as an improper fraction? $\frac{17}{4}$. What is its equivalent Mixed number? $4\frac{1}{4}$.

- Repeat with eighths:



What fraction are these chocolates divided into? Eighths. How many have been eaten (shaded)? 19. How do we write this as a Mixed number? $2\frac{3}{8}$. What is the equivalent Improper fraction? $\frac{19}{8}$.

- Repeat as many times as you feel necessary, using as examples fractions with different denominators. Keep emphasizing the vocabulary: Mixed numbers, Improper fractions.

• Write a Mixed number such as $4\frac{1}{5}$ on the board. Ask the learners if they can work out how to change this to an Improper fraction mathematically, i.e. there is no sketch to count shaded portions. Lead the discussion to come up with a solution:

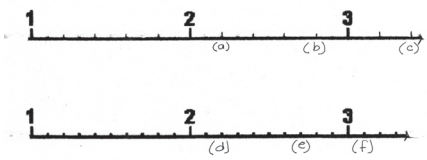
- We are using fifths. In one whole there are 5 fifths. Therefore, in 4 wholes there must be 4x5=20 fifths. Add on the extra fifth: 20+1=21 fifths. $\frac{(4x5)+1}{5} = \frac{21}{5}$. We multiply the whole number by the denominator then add the numerator.
- Do several more examples asking different learners in turn to convert and explain what they are doing: $3\frac{2}{3}$ = 3 (whole number) x3 (denominator) = 9. 9+2 (numerator) = 11. The Improper fraction is $\frac{11}{3}$.

• Use the last Improper fraction you worked out, e.g. $\frac{11}{3}$. Ask the learners if they can work out how to change it to a Mixed number. Through discussion and different learners giving their ideas, establish the rule: Divide the numerator by the denominator: 11÷3=3 remainder 2.

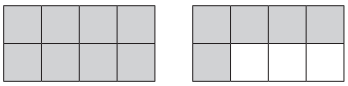
- Therefore there are 3 whole numbers. The remainder, 2, is two thirds: $\frac{2}{3}$. The answer is $3\frac{2}{3}$.
  - Do several more examples getting different learners to explain the process.
  - Emphasise that the line in a fraction which separates the numerator from the denominator means divide. $\frac{1}{2}$ means 1 whole divided by 2.

Consolidation (20 minutes)

- Find sums in the textbook or make your own worksheet to give the learners practice in changing mixed numbers to Improper numbers and vice versa. Help learners while they work, especially those who are having difficulty with this concept.
  - You can give the learners number lines such as the following. They must write the value at a, b, c, d, and e and f as Mixed numbers and Improper fractions.



  - Give the learners a table with at least 10 rows to complete. For example:

Sketch	Mixed number	Improper fraction
		
	$4\frac{3}{5}$	
		$\frac{17}{4}$

ASSESSMENT	**Informal:** Check the learners' written work to see that they can convert between improper fractions and mixed numbers.

WEEK 5: Day 5

Notes to the teacher:

- The focus of today's lesson is on adding and subtracting fractions with denominators that are multiples of each other.
- The learners will also do some adding of Mixed numbers.
- This is not a new concept. The learners were taught this in Grade 5 and in the first term this year. Therefore, brief revision should be sufficient.
- Adding and subtracting fractions requires the learners to make equivalent fractions and change Improper fractions to Mixed numbers.
- Answers must always be in the simplest form. This might be a new concept to the learners, so spend a bit of time on this.
- This lesson will include examples where there is addition and subtraction in one example. Learners must work from left to right (correct order of operations).
- Try to use varied vocabulary, e.g. add, subtract, minus, find the sum of, find the difference between.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some compensating. Earlier in the term, learners learnt how to add and subtract 19. Extend this to adding 99. To do this, they must add 100 then subtract 1. Do a few examples with them, and then give them 10 to 15 exercises to do in their workbooks. They must write down their thinking process. Example:
  - 458+99. Learners write down: 458+100 (=558) -1 = 557.

Concept Development (30 minutes)

- Write a problem such as the following on the board: $\frac{5}{12}$ of the class walk to school, $\frac{1}{4}$ come by bus, and $\frac{1}{6}$ cycle. What fraction of the class is this in total? Let the learners work it out in their groups. See which group is finished first with the correct answer. They can come to the board and show their method to the class. The learners should do the exercise like this:

$$\frac{5}{12} + \frac{1}{4} + \frac{1}{6}$$

$$= \frac{5+3+2}{12} \quad \text{OR} \quad \frac{5}{12} + \frac{3}{12} + \frac{2}{12}$$

$$= \frac{10}{12}$$

Change all the fractions to the same denominator. 12, 4 and 6 can all divide into 12, so change the fractions to twelfths. What we do to the denominator, we do to the numerator. Add the numerators only.

  - Explain to the learners that this is correct so far. However, we always write fraction answers in their *simplest form.* See if any of the learners can tell you what they understand by simplest form. It is the same as making an equivalent fraction, but we must find a factor that is common to (shared by) the numerator and denominator then

divide the numerator and denominator by that factor. In the above example, 2 is a common factor of 10 and 12; they can both be divided by 2. Therefore $\frac{10}{12} \approx \left(\frac{10}{12} \div \frac{2}{2}\right) \approx \frac{5}{6}$ There is no common factor of 5 and 6, so $\frac{5}{6}$ is in its simplest form.

- Give the learners, in their groups, about 10 fractions to write in their simplest forms. Check their answers orally when everyone has finished.

- Write an exercise with addition and subtraction on the board. Let different learners tell you what to do next to calculate the answer.

$\frac{7}{8} - \frac{3}{4} + \frac{1}{2}$

$= \frac{7 - 6 + 4}{8}$ OR $\frac{7}{8} - \frac{6}{8} + \frac{4}{8}$

$= \frac{5}{8}$

ENCOURAGE the learners to do this as *one* sum working from left to right. It is not wrong to do two separate sums but it takes longer and is unnecessary.

5 and 8 do not have a common factor, so $\frac{5}{8}$ is in its simplest form.

- Let the learners do two more examples in their groups.

- Do some examples of adding Mixed numbers. Give the learners an example such as $4\frac{7}{8} + 3\frac{3}{4}$.

$4\frac{7}{8} + 3\frac{3}{4}$.

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

Add the Whole numbers. Change the fractions to the same denominator.

$= 7\frac{13}{8}$

$= 7 + 1\frac{5}{8}$

Change the Improper fraction to a Mixed number. Add the whole numbers.

$= 8\frac{5}{8}$ This is in its simplest form.

- Do two or three more examples on the board with the learners.

Consolidation (20 minutes)

- Individually in their workbooks, the learners must do as many examples as they can. Find work in their textbooks. Examples should include what was covered in this lesson, i.e. adding and subtracting fractions with denominators that are multiples of each other and adding Mixed numbers. Do not include subtraction of Mixed numbers in today's consolidation. If there are any learners having difficulty, work with them.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and participation in class whether they have grasped this concept. Watch them do their written work and mark their workbooks to see which learners understand this work.

Grade 6: Week 6

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 6a, 8c **LO 4 AS 2**	**Milestones:** • Solve problems in context such as financial (simple budgets) • Estimate and calculate by selecting and using operations appropriate 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) • Solve problems involving conversion between appropriate time units including time zones and differences.

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 different units of time	Subtracting different units of time	Multiplying different units of time	Subtraction of Mixed numbers	Budget
Resources	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets. Worksheet – Furniture and appliance shopping (Addendum)

WEEK 6: Day 1

Notes to the teacher:

- Learners need to know how to convert and calculate using different units of time. That is the focus of this and the next lessons.
- Because our number system is base 10, learners sometimes have difficulty calculating between different time units, as they cannot use base 10 for time unit problems.
- Before any calculations can be done, it is important that the learners know the conversions between different units of time.
- The learners must know the correct abbreviations for the different units of time.
- In Maths, a day is always 24 hours. Some learners think it is 12 hours. There is not an exact number of weeks in a month, so conversions between weeks and months are not to be taught.
- The focus of today's lesson will be on addition of hours and minutes. Once the concept of converting between units is grasped, the learners should be able to apply this concept to other units of time.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Subtract 99 using compensation. Discuss with the learners; see if anyone can think of an easy way to subtract 99. They must subtract 100, and then add 1. Do a few examples orally, then give the learners about 10 exercises to complete in their workbooks. They must show their thinking each time. For example: 487-99= 487-100 (387)+1 = 388

Concept Development (25 minutes)

- Briefly revise the following. Use question and answer technique, try to make a game or competition out of it. This will ensure the active participation of the learners. They must not just sit and listen to you telling them the facts.

60 s (seconds) = 1 min (minute)	12 mo (months) = 1 yr
60 min = 1 h (hour)	365 d = 1 yr (366 d in a leap year)
24 h = 1 day	10 y = 1 decade
7 d (days) = 1 wk (week)	100 yr = 1 century
52 wk = 1 yr (year)	1 000 y = 1 millennium

- Tell the learners that Aunt Emma, who bakes for a living, has a new oven. All her recipes tell her baking times in hours and minutes, but the timer on her new oven is only in minutes. They must help her convert the following baking times. Let them work in groups, see which group is finished first:

Recipe for:	Baking time:
Jam tart	1 h 10 min
Bread	1 h 40 min
Rusks	2 h 10 min
Christmas cake	2 h 45 min

- Discuss the learners' answers and how they arrived at them. They must change 1 hour to 60 minutes, and then add on the minutes. If there are two or more hours, they must multiply (or repeatedly add) the number of hours by 60. 2 h = 2x60 min=120 min (or 60+60=120 min).
- Give the groups of learners conversions from minutes to hours and minutes. Tell them that a cyclist spent these times training on 5 consecutive days: 100 min; 145 min; 200 min; 190 min; 165 min. How many hours and minutes did he spend each day?
- Discuss their answers. They must divide the number of minutes by 60. What is left (the remainder) is the minutes. For example: Convert to hours and minutes 195 min. 195÷60=3 remainder 15. 195 min = 3 h 15 min. They can also repeatedly subtract 60 until they obtain a number less than 60. 195-60=135. 135-60=75. 75-60=15. 60 has been subtracted 3 times. This is 3 hours. We cannot subtract another 60 from 15, so the 15 is the minutes. Answer 3 h 15 min.

• Now move on to adding hours and minutes. Give the learners a problem to work out in their groups. For example: Joshua spent 1 h 35 min at soccer practice, and 2 h 45 min doing his homework. How much time did he spend on these two activities? Answer in h and min.

- Walk around and observe how the learners tackle this problem. They will probably use one of the following methods.

  Method 1 Convert everything to minutes, add the minutes then convert back to hours and minutes: 1 h 35 min → 95 min

  2 h 45 min → 165 min.

  165 min + 95 min = 260 min.

  260 min = 4 h 20 min.

  Method 2: Add in columns. The minutes must be added first, then converted to hours and minutes. Carry the converted hours to the hours column.

h	min
$^{1}1$	35
2	45
4	20

35+45=80 min. 80 min = 1 h 20 min. Write the 20 under the min column. Take the 1 (hour) to the hr column and add it to the hours.

- Discuss the two methods with the learners. Method 2 is far more refined and less likely to lead to errors than Method 1, which entails double conversion of larger numbers. *Encourage* the learners to use Method 2.
- Give the learners two or three more exercises to work out in their groups. Give the exercises one at a time. Each time, walk around and see how they are working, and help learners who might be having difficulty. After the learners have had enough time to solve each problem, go through the exercises with them on the board.

Problem Solving (10 minutes)

- Find problems in textbooks which entail adding hours and minutes. While most of the class is busy with these, work with small groups of learners who are still struggling to grasp the concept. Examples of problems:
  - Ms Fit spends 2 h 45 min at the gym and 1 h 50 min jogging each day. How long does she exercise for every day?
  - It takes me 3 h 42 min to walk up the mountain and 2 h 56 min to come down again. How long does it take me to climb up and down the mountain?
  - Mr Couch Potato watched TV for 4 h 50 min in the afternoon and another 3 h 35 min in the evening. How long did he spend watching TV?

Consolidation (15 minutes)

- In their workbooks, all the learners can do:
  - At least 10 examples of converting between units of time, not limited to hours and minutes, For example convert:
    i) 12 days to weeks and days
    j) 18 months to years and months
    k) 200 weeks to years and weeks.
  - 5 or more exercises adding hours and minutes. The work can be completed for homework.

ASSESSMENT	**Informal :** See which learners have grasped this concept by their verbal responses and how they complete their written tasks.

WEEK 6 : Day 2

Notes to the teacher:

- Today's lesson focuses on subtraction of different units of time.
- Learners must be encouraged to apply what they know about addition of units of time to subtraction of units of time.
- The lesson on addition focused on hours and minutes. Today we will use different units of time to prevent the learners thinking only in terms of "60 minutes to the hour".
- The concept of converting is the same throughout problems involving time calculations. Ensure the learners know how to convert.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise subtracting 2- and 3-digit numbers. Do a few orally, asking different learners to give the answers to different exercises. After that, make it a group (or pairs) competition. See who can write down the answers only to 10 subtraction exercises you have written on the board. Watch that there is no written working-out. (i.e. this is a mental activity.)

Concept Development (20 minutes)

- Give the learners in their groups a problem such as the following to solve: My brother is 5 y 11 m old. My sister is 6 y 3 m older than him. How old is my sister?
  - Hopefully, the learners will be able to apply their knowledge of adding hours and minutes to solving this problem. They can use any method learnt in the previous lesson. The important thing is that they know there are 12 months in a year. The answer to the above problem is 12 y 2 m.
  - Give them another addition problem involving hours and days.
- Move on to subtraction. Pose the following problem to the whole class (write the numbers, not necessarily the whole problem, on the chalkboard): *We had 5 wk 6 d holidays over Christmas. I went to stay with my grandmother for 2 wk 3 d of that time. How long did I stay at home?*
  - Let the learners give their ideas of how to solve this. They will probably find it quite straightforward. In this particular problem, it would be an unnecessary waste of time to convert everything to days, and then back to weeks and days. The best method would be to subtract 6 d-3 d = 3 d then subtract 5 wk-2 wk=3 wk. Answer: I stayed at home for 3 wk 3 d.
  - Change the problem slightly: *We had 5 wk 4 d holidays over Christmas. I went to stay with my grandmother for 2 wk 5 d of that time. How long did I stay at home?*
  - Let the learners give their ideas of how to solve this: let them make the mistake and then correct it later on the board. Many will probably want to subtract 5d-4d. This is incorrect. They need to convert a week into days:

wk	d	
~~5~~ 4	$4^{+7=11}$	
2	5	You cannot subtract 5 from 4
2	6	1 week = 7 days. Add 7 d (1 wk) to the days (4) = 11 days.
		Subtract the days (11-5) = 6. Subtract the weeks (4-2) = 2

- Do one or two more examples on the board with the whole class. Use different units of time. Identify the learners who are not participating well or do not appear to understand.

Consolidation (15 minutes)

- Work with learners who are having difficulty with the concept of converting and calculating using different units of time. The other learners can work in groups, pairs or individually to do exercises that involve subtraction of different time units. You can find these in a textbook, or give at least 8 examples (which can be completed for homework) such as:
  - 11 h 18 min – 6 h 45 min
  - 28 y 3 m – 32 y 9 m
  - 5 d 6 h – 3 d 12 h

Problem Solving (15 minutes)

- Give the learners at least 5 problems to solve. These can be completed for homework. Examples:
  - Martin was 11 y 6 m old when his family moved to Limpopo Province. He is now 14 y 3 m old. For how long has he lived in Limpopo Province?
  - I promised to help my father in the garden for 4 h 20 min. I have worked for 2 ho 55 min. For how much longer do I still need to work?

ASSESSMENT	**Informal :** Assess from the learners' written work and oral responses whether they have grasped this concept.

WEEK 6 : Day 3

Notes to the teacher:

- Today's lesson continues with calculations involving converting units of time, but the focus today is on multiplying units of time.
- Hopefully the learners are now converting confidently.
- Multiplication of units of time differs from addition and subtraction slightly. The two different units of time are first multiplied separately. The smaller unit of time is then converted. After that, the units are added. This is because of the order of operations when there are mixed operations. You cannot add before you multiply.
- Use as many different units of time as possible.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" (see Addendum).
- Give the learners 10 or 15 time conversions to work out in their workbooks. Examples:
  - 100 min = ….. h …….min
  - 52 h = ……..d……h
  - 75m = ……..y…….m

Concept Development (20 minutes)

- Pose the following problem for learners to work out in their groups: *Minnie makes bead necklaces to earn pocket money. She takes 2 h 40 min to make one necklace. How long will it take her to make 8 necklaces?*
  - After enough time, discuss the groups' methods and answers. The most efficient method would be to multiply the hours and minutes separately. After that, convert the minutes to hours and minutes. Add the hours:

    2 h 40 min x 8
    = (2 h x 8) + (40 min x 8)
    = 16 h + 320 min
    = 16 h + 5 h + 20 min
    = 21 h 20 min

    Note: this is NOT the same as adding, where the min are converted and added to the hours *before* adding the hours. The h and min must be multiplied separately first.

    Another method would be to convert the hours to minutes, then multiply and convert back to hours and minutes. This is perfectly acceptable, but might lead to errors because of larger numbers. However, if the learners are more comfortable with this method, it is fine for them to use it: 2 h 40 min = (2x60) + 40 min = 160 min.
    160x8= 1 280 min.
    1280÷60= 21 h 20 min

- Give the learners at least two more multiplication exercises to work out. You can either let them do this in their groups, or together with the whole class on the board (if you do it this way, make sure the learners participate actively by using question and answer techniques, or let individual learners take turns to complete each stage of the problems). Use different units of time.

Problem Solving (15 minutes)

- Work with learners who are struggling with multiplication of units of time. Other learners can complete 3 to 4 problems involving multiplying units of time. Examples:
  - We spend 6 h 15 min at school each day. How many hours and minutes do we spend at school in a week (5 days)?
  - It takes 3 w 4 d for Mars to orbit the sun. How many weeks and days does Mars take to orbit the sun 7 times?

Consolidation (15 minutes)

- All the learners can complete 8 to 10 exercises to practise multiplying different units of time. Walk around the class while they are working and help learners who are still unsure of this concept. This work can be completed for homework. It is a good idea to include some exercises using addition and subtraction. Examples of multiplication exercises:
  - 5 w 2 d x 5
  - 12 y 6 m x 8
  - 15 d 8 h x 6

ASSESSMENT	**Informal :** Mark the learners' books to see that they understand multiplying units of time.

WEEK 6 : Day 4

Notes to the teacher:

- Today's lesson continues from the previous lesson on adding and subtracting fractions and Mixed numbers.
- The focus today is on subtracting Mixed numbers. This often entails borrowing from the whole number when the numerator to be subtracted is larger that the numerator being subtracted from.
- This can be quite a difficult concept for the learners to grasp. Be thorough in discussing the concept.

Resources:

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do times table drilling and practice. You can play Tables King or use "Clock multiplication". Finish off with a quick test of 10 multiplication exercises (up to 12x12) where the learners write down the answers to your oral questions. They can check each other's work.

Concept Development (25 minutes)

- Briefly revise the steps to take when adding Mixed numbers. Give the learners a problem such as the following to work out in their groups. Make sure the second fraction can be subtracted from the first fraction without any borrowing: *It took us $5\frac{5}{6}$ of hours to get from home to our cousins' home. We stopped for $1\frac{2}{3}$ hours on our journey. How long did we drive for?*

  - $5\frac{5}{6} - 1\frac{2}{3}$

  - $= 4\frac{5-4}{6}$

    Subtract the whole no.; change the fractions to the same denominator

    $= 4\frac{1}{6}$. This is in its simplest form, so is the final answer. Keep reminding learners that the final answer must be in simplest form.

  - In groups, give the learners another subtraction exercise to try to work out. This time it will be necessary to borrow from the whole number. Do not expect any except the top Maths learners to get it right the first time, but let them try it BEFORE doing it on the board. Example:

    $3\frac{1}{2} - 1\frac{5}{8}$

    $= 2\frac{4\square 5}{8}$

    Subtract the whole no.; change the fractions to the same denominator

    -

    $= 1\frac{8+4\square 5}{8}$

    We cannot subtract 5 from 4. Convert 1 whole to 8- eighths (we are working in eighths). The whole number becomes 1 less, and the numerator 8 of the 8-eighths is added to the first numerator (4)

    -

    $= 1\frac{7}{8}$ This is in its simplest form.

- Do at least another four to five examples with the whole class. This can be a confusing concept.

Problem Solving (25 minutes)

- Find problems in the textbook which entail subtraction of Mixed numbers, make your own worksheet, or write problems on the board. The learners can work individually in their workbooks, but let learners in their groups discuss their methods and help each other. Take small groups of learners and help them with their work. You can include addition problems as well.

ASSESSMENT	**Informal :** Judge from learners' participation in class, their oral responses, and their written work whether they can subtract Mixed numbers.

WEEK 6: Day 5

Notes to the teacher:

- Understanding and dealing with money affects everyone.
- The focus of today's lesson is on simple budgets. A budget means planning how to spend money available to you.
- It is important to have a budget to avoid getting into debt.
- Learners need to know the vocabulary in dealing with budgets: income (from e.g. salary, wages or home industry) and expenditure (what we spend). The difference between income and expenditure is called the balance.
- The learners will also come to realise the difference between what we need and what we want. They will hopefully gain some appreciation of the responsibilities involved in working with money and running a household.
- Adapt this lesson to suit your learners and their environment.
- This integrates with Economic and Management Sciences.

Resources: Chalkboard, worksheets, calculators, Furniture shopping list (see Addendum).

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" with different operations, doubling and halving.
- Give the learners 10 exercises. Say these as problems. The learners must just write down the answers. Examples:
  - There are 32 learners in the class. How many eyes and noses are there?
  - I had two R20 notes. I bought 3 litres of milk @ R7 a litre. How much change do I have?
  - How many minutes in $2\frac{1}{4}$ hours?
  - A famous war ended in 1610. How many centuries ago is this?

Concept Development (25 minutes)

- See if any of the learners can remember from Grade 5 what a budget is. Ask them why it is important to have a budget. Discuss debt, explaining how difficult it is to get out of debt once one is in debt. Ask the learners if there are any things that adults actually need to borrow money to buy – e.g. should adults borrow money to buy a new pair of jeans, a new TV. Explain that almost everyone in the world has to borrow money to buy a home, as it is very difficult to save to pay for a new home with cash. Another thing we usually borrow money for is to purchase a car. Discuss what kinds of cars people need, e.g. is it necessary to buy a brand new, luxury car when a small, relatively inexpensive car will be adequate for our needs. This is tied up with needs and wants.
- Give learners in their groups a copy of the addendum – Furniture and Appliance shopping. Tell them that they are newly married and have been given R36 000 by their parents to buy things for their first home. Learners must discuss what they would buy and have a reason for their choices.

- Hopefully there will be some animated discussion in the groups. Some learners might be tempted to buy the most up-to-date television, and not realize that they actually need a double bed (or two single beds) for two people.
- After the learners have decided what they would purchase, check that they are all within their budget (explain this terminology). Then let each group tell you and the rest of the class what they decided to buy.
- It is worth discussing with the learners whether it is always wise to buy the cheapest item. Sometimes we must spend just a bit more because the more expensive item will hopefully be a better deal in the long run. It would be silly to, e.g., buy a microwave oven which limits what one can cook. Most people keep their ovens for many, many years, so it is worth investing in a good one.
- Discuss needs and wants. Is a dishwasher necessary or can the newly-weds wait a few years?

• Now that the newly-weds are settled into their home, they have expenses. Discuss what we mean by expenses. Brainstorm with the learners the kinds of expenses most adults have: rent, electricity, water, groceries, transport, medical, clothing. Write a list of expenses on the board and explain what each one means. Discuss where people get their income from to cover their expenses: mostly from salary (money you get for the work you do), some people are in their own business, e.g. offering a service, making things to sell, etc.

Investigation (25 minutes)

• The learners must help Mr and Mrs Thomas with their list of April income and expenses. Unfortunately, Mr and Mrs Thomas wrote a list of their income and expenses, but it was just a random list, not in any order or in columns. From the list, the learners must decide whether each item is an expense or income. If it is an expense, the must fill it in under the correct sub-heading. Discuss any words that the learners might not understand before they start working. They can use their calculators for this task.

- Table to be filled in:

INCOME		EXPENSES	
Salary		**Living expenses**	
Other income		**Personal expenses**	
		Entertainment expenses	
Total income for the month		**Total expenses for the month**	

- The list:

Item	Amount in Rands	Item	Amount in Rands	Item	Amount in Rands
Rent	1 500	Mrs Thomas' salary	2 525	Medical Aid	696
Going to movies	224	TV channel subscription	392	Groceries	3 057
Mr Thomas' salary	4 010	Doctor's account	210	Rent for room from person staying in house	275
Clothing	876	Eating at restaurants and take-away food	524	Electricity	156
Water	122	Money from working overtime	400	Transport	525
Telephone	123	Insurance	244	Toiletries haircut and make-up	422

- After the learners have completed the table, they must answer questions such as:
  a) What is the total income?
  b) What are the total expenses?
  c) Identify and write down areas where Mr and Mrs Thomas could save money – are all their expenses necessary?
  d) If Mr and Mrs Thomas hadn't gone to restaurants or bought take-away food that month, would they have been within their budget?
  e) What do you think would happen if Mr and Mrs Thomas continued to spend more than they earn each month?
- When the learners have completed the task, spend some time discussing the answers to questions c-e.

ASSESSMENT	**Informal:** The group work about buying furniture and the written work done by the learners will enable you to see that they understand what a budget is.

Grade 6: Week 7

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 4b, 6a, 8g **LO 2 AS 4**	**Milestones:** • Recognise the place value of digits to at least 1 decimal place. • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtraction of positive decimals with at least 1 decimal place. • Solve problems in context such as financial (profit and loss). • Write number sentences to describe a problem situation within a context.

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:	Decimal fractions to one decimal place	Adding and subtracting decimal fractions	Adding and subtracting decimal fractions	Writing number sentences to solve problems	Financial: Profit and loss
Resources	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets

WEEK 7: Day 1

Notes to the teacher:

- The focus of today's lesson is on decimal fractions. Learners need to know the place value of decimal fractions to at least one decimal place and their common fraction equivalent forms (where such equivalent fractions can be made).
- Decimal fractions are a continuation of our base 10 number system. They are the calculator's way of writing fractions.
- The place value of the first decimal place after the decimal point (or comma as it is known in South Africa) is called tenths. Its abbreviation is t (not to be confused with Tens-T)

Resources: Chalkboard, textbooks, number lines (see Addendum), calculators.

DAILY ACTIVITIES

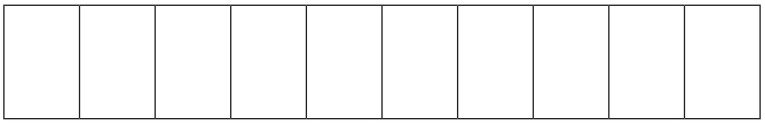
Oral and Mental Activity (10 minutes)

- Do some tables drilling. Practise tables which learners do not know so well.
- Practise rounding off to the nearest 5, 10, 100 and 1 000. Give the learners 5 numbers to round off. They can draw columns in their workbooks and complete. Example:

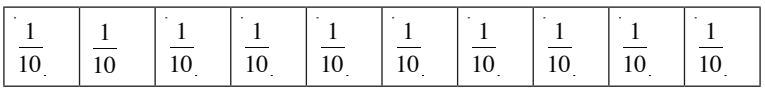
Round off to nearest:	5	10	100	1 000
12 589				
7 999				

Concept Development (25 minutes)

- Draw a block such as the following on the board.



- Ask the learners what fraction each small square represents. Tenths. Ask a learner to come and write the correct fraction in each small square. Do not erase this, you will need it later.



- See if any learners can think of another way of writing $\frac{1}{10}$. Listen to their ideas. If they do not come up with the correct answer, give them a clue "calculator". Lead them to the conclusion that the other way to write $\frac{1}{10}$ is 0,1.

- Explain to them that the decimal comma (shown as a **.** on the calculator) separates the whole numbers on the left from the decimal fractions (parts of a whole) on the right.
- Give the learners a decimal number line page per group (see Addendum). This page can be cut so that each learner has two of his/her own number lines. Using the divisions on the number lines, practise counting in tenths: 0,1 (say "Nought comma one") ; 0,2; 0,3; …..1; 1,1; 1,2; …..2; up to 10. The learners must keep the number lines for using later.

• The learners are familiar with place value of whole numbers. Now it will be extended to include decimal numbers.

- Write place value headings on the board, then write a whole number on the board, e.g. 542 156. Ask a learner to come and write the digits in their correct place. Say this number in words, then say it in expanded notation.

H Th	T Th	Th
5	4	2

H	T	U
1	5	6

- Now write another number on the board, this time with a decimal comma and one digit after the comma. Example: 2 105,8. Ask a learner to come and write the digits in the correct places. Say the number in words and in expanded notation: Two thousand one hundred and five comma eight: (2x1 000)+(1x100)+(5x1)+(8x0,1)

H Th	T Th	Th
		2

H	T	U	,	t
1	0	5	,	8

- Ask the learners what they think we call the place value after the decimal comma. Think of its common fraction name to give them a clue. It is called tenths, abbreviation t. Fill this in on the correct column:

H Th	T Th	Th
		2

H	T	U	,	t
1	0	5	,	8

- Give the learners several more numbers to fill in correctly in columns on the board. Each time say the number in words and write it in expanded notation.

• Ask the learners to take out their calculators. Play a few games of "Zap" (see Addendum), including numbers with one decimal place.

• Now talk about decimal fractions and their equivalent common fractions. Refer to the blocks you drew on the board.

- Ask the learners if they can tell you how many tenths are the same as a half. $\frac{5}{10}=\frac{1}{2}$. How do we write $\frac{5}{10}$ as a decimal fraction? 0,5. Let the learners check this on their calculators. Enter: 1÷2=0.5.

- Repeat with $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; $\frac{4}{5}$. Check on the calculator each time.

Consolidation (25 minutes)

- On the first number line, tell the learners to mark the place that represents for example: 0,4; 1,7; 5,3, 8,2 etc. Give them about 8.
  - On the second number line, tell the learners to mark the place that represents for example: $\frac{1}{2}$; $2\frac{3}{10}$; $5\frac{1}{5}$. Give them about 8.
  - Give the learners about 6 to 8 numbers (some without a decimal fraction) to write in expanded notation.
  - Give the learners numbers to build up from expanded notation form. For example, write the number that is (4x1)+(7x100)+(3x0,1)+(8x1 000)+(6x10). They can also write the numbers in words. Give them about 5.

ASSESSMENT	**Informal :** Observe the learners working in their workbooks to see how well they understand decimal fractions to one decimal place.

WEEK 7: Day 2

Notes to the teacher:

- Now that the learners have been introduced to decimal fractions to one decimal place, they can use this knowledge to convert between millimetres and centimetres.
- Up till now, learners have been writing, e.g. 11mm as 1 cm 1 mm. As 1 mm is one tenth of a centimetre, they can write 11 mm as 1,1cm.
- The focus of today's lesson is on converting between mm and cm in preparation for adding and subtracting decimals up to one decimal place.

Resources: Textbooks, chalkboard, worksheets, rulers

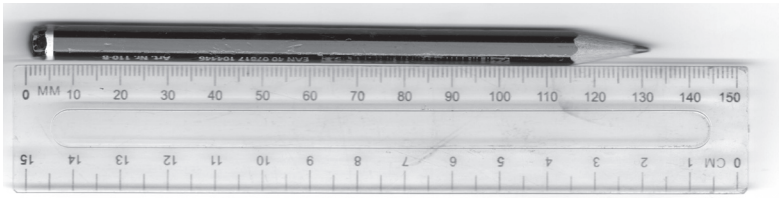
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count backwards and forwards in decimal numbers. The whole class together, groups of learners (e.g. boys or girls, or groups how they sit) or individual learners can take turns to count. Do not always start or end at zero. For example:
  - Start at 20,5. Count in tenths until 23,7.
- Give the learners some written work to do, for example:
  - Write down the missing numbers: 5,7; 5,8; …..; ….. 6,1
  - What number is one tenth more than: 5,6; 14,9?
  - What number is two tenths less than: 7,9; 10,1?

Concept Development (20 minutes)

- Ask the learners to take out their rulers and pencils and measure their pencils like this:



  - Ask one learner how long his pencil is. In the example above, he would say 133mm, or 13 cm 3mm.
  - Ask the learners if, using their knowledge of decimal fractions (tenths), they can say 13cm 3mm using *only* the centimetres. You will probably have to guide their thinking: What fraction of a centimetre is a millimetre? ($\frac{1}{10}$ - on tenth). How do we write one tenth as a decimal fraction? (0,1). One millimetre is $\frac{1}{10}$ of a centimetre, so we can write 1mm=0,1cm. Therefore, 13cm3mm= 13,3cm.
  - Repeat the above as many times as necessary for learners to grasp the concept. Each time you can ask a different learner to say how long his pencil is. His friend sitting next to him can check. Go through the process of converting each time.

- Repeat by measuring other items, e.g. erasers, sharpeners, the width of a finger. Give as many learners as possible an opportunity to read the measurement then convert the measurement into centimetres using a decimal comma.

Consolidation (15 minutes)

- Give the learners a table such as the following to complete. This will give them more practice in estimating, measuring and converting to decimal fractions. Give them at least 10 items to measure using cm and mm. An example is done for you:

Item	Estimate	Actual measurement in cm and mm	Actual measurement written in cm as a decimal fraction
Width of calculator	8cm	6cm7mm	6, 7cm

- Find examples in textbooks to practise converting and writing as decimal fractions to one decimal place. The learners should do as many as possible. They can complete the work for homework.

Assessment Task (15 minutes)

- Give the learners problems to solve for formal assessment in the following concepts:
  - Adding, subtracting and multiplying different units of Time.
  - Time zones – differences in times between places.

ASSESSMENT	**Informal :** Assess the learners' grasp of the concept of converting decimal fractions from their verbal responses and their written work.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 4 AS 2: Solve problems involving calculation and conversion between appropriate time units including time zones and differences.

WEEK 7 : Day 3

Notes to the teacher:

- The focus of today's lesson is on adding and subtracting decimals up to one decimal place. By giving the learners problems that entail converting between mm and cm, decimal fractions will become more meaningful. Such problems will also give the learners additional practice in converting between these units of measurement and integrate with NS and Technology.
- If learners are competent in adding and subtracting in columns, adding and subtracting decimals to one decimal place should be easy for them.
- The learners can use their knowledge of adding and subtracting common fractions with the same denominator – in this case tenths – to add and subtract decimals. However, this is not the most refined method.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a "mixed bag" of counting activities. Start off doing some orally (as described in Week 7 Day 2). Counting can be randomly asked and must include:
  - Counting forwards and backwards in whole numbers. Examples: Count forwards in 12s from 53 to 125. Count backwards in 7s from 94 to 38.
  - Counting forwards and backwards in fractions. Examples: Count forwards in fifths from $13\frac{1}{5}$ to 17. Count backwards in twelfths from $8\frac{5}{12}$ to 5.
  - Counting forwards and backwards in decimal numbers.

Concept Development (25 minutes)

- Give the learners the following problem to solve in their groups. You can say the problem but write the numbers on the board. *Thabo's pencil is 24,4cm long, and Dylan's pencil is 18,8cm long. What is the total length of their pencils?* Walk around the class and check what the learners are doing. Afterwards, let two or three learners from different groups come to the board and show the rest of the class what method their group used. Any of the following methods (perhaps some others) are acceptable. However, encourage learners to add in columns:
  - Method 1: Breaking down the numbers: 24,4 = 20+4+0,4

    18,8 = 10+8+0,8

    (20+10)+(4+8)+(0,4+0,8)=30+12+1,2

    =30+10+2+1+0,2

    =43,2 cm.
  - Method 2: Breaking down the numbers, converting the decimal fractions to common fractions: $24{,}4 = 20+4+\frac{4}{10}$

    $18{,}8 = 10+8+\frac{8}{10}$

    $(20+10)+(4+8)+(\frac{4}{10}+\frac{8}{10})$

$=30+12+\frac{12}{10}$

$=30+10+2+1+\frac{2}{10}$

$=43\frac{2}{10}$

=43,2 cm.

You can see this is a long and laborious method, not to be encouraged.

- Method 3: Adding in columns. This is by far the quickest method and is to be strongly encouraged.

$$\begin{array}{rccc} & {}^{1}2 & {}^{1}4 & , & 4 \\ + & 1 & 8 & , & 8 \\ \hline & 4 & 3 & , & 2 \\ \hline \end{array}$$

Two key things:
Line the decimal commas under each other.
Start with the tenths and work from right to left, carrying over as the learners have been shown.

43,2 cm (always remember to write a complete answer).

- Do two or three more addition exercises with the learners, showing them the column method. Each time, emphasise that the decimal commas must line up. This is important when learners do problems with numbers containing different numbers of digits, e.g. 5,8+32+17,025 – don't worry about this now, just line those commas up!

- Once the learners have grasped the concept of lining up commas and starting with the tenths, you can move on to subtraction of decimals. Give them a problem such as the following in their groups: *Thabo's pencil is 24,4cm long, and Dylan's pencil is 18,8cm long. What is the difference between the lengths of their pencils?* Walk around and observe their subtraction methods. If any groups have used the column method, let them come up and explain their method to the class. As they do so, clarify and repeat their explanation. Remind the learners about borrowing. Some learners will want to subtract the top number from the bottom number – be on the lookout for this.

$$\begin{array}{rccc} & \cancel{2}1 & \cancel{4}{}^{1}3 & , & {}^{1}4 \\ - & 1 & 8 & , & 8 \\ \hline & & 5 & , & 6 \\ \hline \end{array}$$

- Make sure the answer is complete: 5,6 cm (is the difference).
- Check by adding: 5,6+18,8=224,4.
- Do two or three more subtraction exercises with the learners.

Consolidation (15 minutes)

- Give the learners 5 to 10 addition and subtraction exercises to practise adding and subtracting decimal numbers to one decimal place. They can work individually in their workbooks. Mix up the adding and subtracting – do not, e.g. do 5 addition exercises

- followed by 5 subtraction exercises. You can write the exercises on the board. Work with learners who are not fully competent in this concept.

Problem Solving (10 minutes)

- Give the learners a few problems to solve. For example:
  - My hand is 75,6 cm wide. My friend's hand is 68 cm 5 mm wide. What is the sum of the width of our hands? What is the difference between the widths of our hands?
  - I watched an ant crawling along my ruler. When I first saw it, it was on the 75mm mark. The next time I looked, it was on the 13,2 cm mark. How far had the ant walked?

ASSESSMENT	**Informal:** Mark the learners' books to check they understand how to add and subtract decimal fractions.

WEEK 7 : Day 4

Notes to the teacher:

- Problem solving (word sums) is often difficult for learners because they do not know which operation(s) to use.
- Learners must be guided to be able to analyse a problem and sift out the unnecessary information in the problem. Thereafter, they can focus on *wha*t the question is asking and write this in a number sentence. Once this is done, problem solving becomes much easier.
- Although writing number sentences is the focus of today's lesson, this skill should be practised every time the learners have to solve problems.
- Today, learners do not have to solve the problems. The essential thing is that they write number sentences. However, if you want them to solve the problems, this would be good revision of using all the operations. They could also practise their calculator skills by solving the problems using a calculator.
- Instead of writing a square as the place holder (unknown), the learners can start writing a letter. This will help them when they start Algebra in higher grades.

Resources: Chalkboard, textbooks, worksheets. A printed sheet containing a variety of problems would be useful. Learners can highlight or underline key words as they work through the problems.

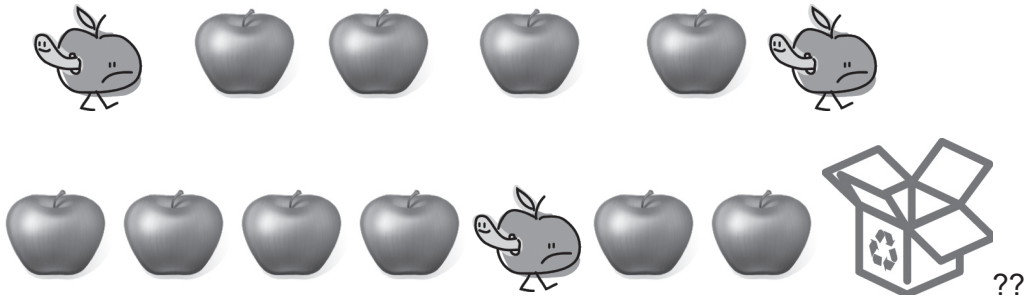
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

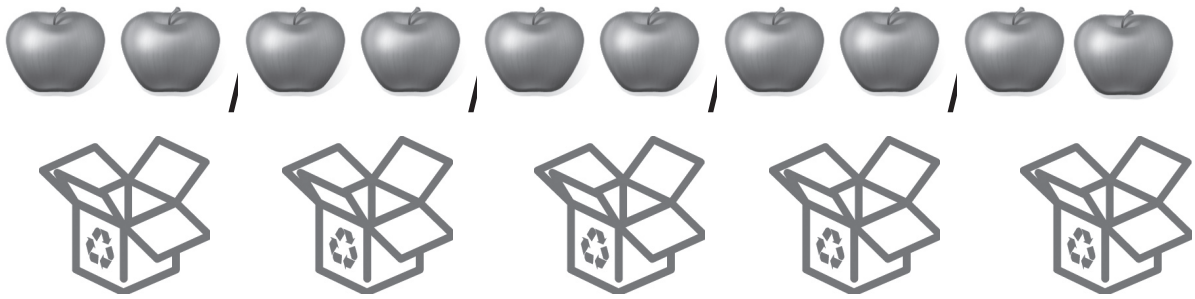
- Play "Tables King" (see Addendum)
- Give the learners a quick, written test where they have to write down the answers to addition, subtraction, multiplication and division exercises. Do not put these in problem form. You can say the exercises or have printed sheets on which they can write down the answers.

Concept Development (20 minutes)

- Write a problem such as the following on the board: *The farmer picked 4 560 apples. 320 had worms in them, so he gave them to his farm animals to eat. The rest he packed in boxes of 80 apples each. How many boxes of apples did he pack?*
  - Learners have to know which operations to use. It is useful if they can highlight or underline the numbers in the exercise. On the board, underline or circle in colour the numbers of apples 4 560, 320 and 80.
  - Underline the question being asked in another colour: How many *boxes* ….
  - It can be useful to substitute smaller numbers and draw a picture: 13 apples were picked. 3 had worms in them. The rest were packed in boxes of 2. How many boxes.



- What do we do? First we have to take 3 away. We write 10-3. Because we have to
- subtract first, write this in brackets: (10-3). Erase the 3 apples with worms in them:



- By question and answer method, ascertain from the learners that we now have to divide the apples into boxes: Our number sentence is now extended: (10-3)÷2=☐ boxes.
- Go back to the original problem. Get the learners to read it again, and write the number sentence for it: (4 560-320)÷80=☐ boxes.
- Instead of using the ☐ as the place holder, learners can use a letter. This will slowly introduce them to Algebraic concepts. So their number sentence will be:
  (4 560-320)÷80= y boxes. (Any letter can be used.)
- Learners must always ask themselves: Does my answer make sense? Have I answered the question?
- If you ask the learners to solve the problem, they can check the answers on their calculators by using the opposite operation: In the above example, the answer is 53 boxes. Check: 53x80 (x is the opposite of divide) = 4 240. 4 240+320 (+ is the opposite of -)=4 560 (the number of apples the farmer picked. Our answer must be correct).

- Give the learners, in their groups, several problems for which they must write number sentences. Each problem must use different operations. After each problem, go through it step by step. Check that the learners are using a letter for the unknown. Make sure that if you give them problems with more than one operation, there are brackets inserted if necessary (BODMAS).

Consolidation (15 minutes)

- Give the learners about 8 to 10 problems for which they must write number sentences. They can do this in their groups or with a partner, but each learner must write each number sentence in their workbook. Help the learners who have difficulty. They do not need to solve the problems.

Problem Solving (15 minutes)

- The learners can write number sentences and solve about 6 problems. Give the learners problems which practise using different SI units, problems that integrate with NS and Technology or deal with profit and loss or budgets. Always try to revise previously learnt concepts.

ASSESSMENT	**Informal:** Take note of the learners' oral responses and mark their written work to see that they can write a number sentence to help them solve a problem.

WEEK 7 : Day 5

Notes to the teacher:

- Everybody needs money to be able to live. Some people receive salaries or wages by working for others. Some people have their own businesses. The latter take their money out of the profit they make by conducting their business.
- Profit is the difference between the cost price of goods bought by the businessman and the selling price to the consumer. The selling price must be more than the cost price to call it a profit.
- If the selling price is less than the cost price, we call this a loss.
- The cost price of goods must include all expenses incurred in obtaining those goods. This is quite an in-depth concept and will not be dealt with in Grade 6. The learners need to understand the concept of profit and loss.
- Make the lesson relevant to the learners' environments.

Resources: Textbooks, chalkboard, worksheets. Prepared Mental Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Use this time for assessing learners' abilities to add, subtract, multiply (up to 12x12) and count in decimals. This is required for Assessment Task 2.

Concept Development (25 minutes)

- Draw a sketch such as the following on the board. Tell the learners to look at it for a moment, then discuss the picture with them by asking questions such as:

  - What is this person doing? He is standing with food (a hot dog) and an egg lifter in his hands. Where do you think he is? Perhaps at a market, perhaps outside a shop on a pavement. How do you know this? He has a barrow and an umbrella, so he can't be inside a shop or his kitchen. Why is he holding the hot dog like that? He wants to sell it. Why is he trying to sell the hot dog? He wants to make money.
  - Discuss making money. This man is making money by selling food. Brainstorm other things people can do to make money. Discuss that some people, from the street vendor to large supermarkets and shops, buy and sell goods to make money. Other people get salaries or wages from their employers. (These are not the only ways to make money, but these examples will be sufficient).

- Discuss the hot dog vendor again. Ask the learners how much he would sell a hot dog for. Settle on a realistic figure (R15 for example). Ask the learners if they think that R15 is how much money he makes out of selling a hot dog? No, he has expenses or costs he must deduct. Discuss his expenses – the bread roll, margarine, tomato sauce and mustard, the sausage. (There are other expenses, but do not include them at this stage). Item by item, come up with how much the hot dog *cost* the vendor to make. For example, the ingredients total R8,00.
- Ask the learners to calculate the difference between the hot dog vendor's selling price (R15) and his cost price (R8). See if anyone knows what this difference is called. It is a profit. He makes R7 profit on one hot dog.
- Ask a few questions such as: Approximately how many hot dogs must the vendor sell in a day to earn R150? R250? Is this a good income? If he sold 100 hot dogs, how much profit did he make? Is this a good amount of money to make in a day? Do you think he could sell 100 hot dogs in a day?
- Tell the learners it is the end of the day, the vendor is tired and wants to go home. He sells his last two hot dogs at R7,50 (half price) each. Did he make a profit on those two hot dogs? No, his selling price was less than his cost price. He made a loss.

• Give the learners in their groups a table such as the following to complete. They can use their calculators if they want to. See which group finishes first: Discuss their answers afterwards. Emphasise the words Profit and Loss.

ITEM	COST PRICE	SELLING PRICE	DIFFERENCE	PROFIT OR LOSS
Loaf of bread	R5,75	R8,99		
Pair of jeans	R75,00	R178,99		
Magazine	R13,45	R12,99		
Computer	R3 450	R6 666		
Beaded necklace	R23,99	R18,50		
Litre of milk	R7,50	R6,99		

Problem Solving (25 minutes)

• Give the learners problems from their textbooks, make a worksheet or write problems on the board, for the learners to solve. They must write open number sentences, and make sure their answers are complete with labels (bananas, eggs, R, etc.). They can use their calculators for these problems but must write down what they entered in the calculator. Examples:
  - A vendor bought 500 eggs at R80 per 100 eggs. If he sold the eggs for 92 cents per egg, how much profit or loss did he make?
  - A vegetable vendor purchased 100 kg of tomatoes for R300. He sold them at R4 per kilogram. How much profit or loss did he make on one kilogram of tomatoes?

- For the Grade 6 market day, a group of learners decided to make and sell popcorn. Below is the list of what they bought. At the end of the day, they had sold 48 packets of popcorn and had R120 in their money box.
  a) Calculate their total expenses (cost price)
  b) Calculate how much they sold each packet of popcorn for.
  c) Calculate their total profit or loss for the day.
  d) Calculate what profit they would have made if they had sold the 48 packets of popcorn for R4 per packet.

Shopping list

Popcorn – 5 packets @ R5,99 each

Butter: 500 g @ R24,99

Salt" 500 g @ R 2,50

Cooking oil: 1 litre @ R18,95

Plastic bags for packing: 100 bags @ R12,50 for 50.

ASSESSMENT	**Informal:** Walk around and observe the learners as they do their work. Ensure that they understand the concept of Profit and Loss.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO1 AS 1, 9a, 9b,: Count forwards and backwards in decimals. Mental calculations involving addition and subtraction, multiplication of whole numbers to 12x12.

Grade 6: Week 8

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 8d, 8e, 8j, 10a.	**Milestones:** • Estimate and calculate by selecting and using operations appropriate to solve problems that involve - Multiplication of at least whole 4-digit numbers by 1-digit numbers - Division of at least 4-digit by 3-digit numbers - Multiple operations of whole numbers with or without brackets. • Use a range of techniques to perform written and mental calculations with whole numbers including multiplying 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:	Multiplying in columns (10s and multiples of 10s)	Multiplying in columns	Multiplying 4-digit by 1-digit numbers	Dividing 4-digit by 3-digit numbers	Multiple operations of whole numbers (BODMAS)
Resources	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets Prepared Assessment Task (Multiplication)	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets Prepared Assessment Task (Time problems)

WEEK 8: Day 1

Notes to the teacher:

- Learners are required to be able to multiply in columns. This method has been shown to the learners and they have been encouraged to use it. Now they must use it. It is by far the quickest and most accurate method of multiplying.
- Keep reminding the learners that any number multiplied by zero is zero.
- Multiplication is commutative. 7x6=6x7.
- Today's lesson will focus on multiplying by 10s and multiples of 10. This will help the learners to understand the reason why, when we multiply by the 10s digit in column multiplication, we put down a zero.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give learners a table, containing about 10 rows, such as the following to complete. Afterwards, discuss what they observed: multiplication is commutative, and division is the opposite of multiplication.

5x7=	7x5=	35÷7=	35÷5=
8x6=	6x8=	48÷8=	48÷6=
9x5=	5x9=	45÷9=	45÷5=
12x7=	7x12=	84÷12=	84÷7=

Concept Development (20 minutes)

- Write a row of numbers on the board, such as:

5 7 9 12 3 65 28 44 37 2 98 16

- Ask learners in turn to multiply each number by 10. The learners can come and write the answers on the board. They can use a calculator if they need to.

	5	7	9	12	3	65	28	44	37	2	98	16
X10	50	70	90	120	30	650	280	440	370	20	980	160

Ask the learners to tell you what they observe when we multiply a number by 10. All we need to do is add a zero to the end of the number. Ask the learners what they think the shortcut will be when we multiply a number by 20. Get learners to take turns to fill in the next row, and then establish a shortcut rule.

	5	7	9	12	3	65	28	44	37	2	98	16
X10	50	70	90	120	30	650	280	440	370	20	980	160
X20	100	140	180	240	60	1300	560	880	740	40	1960	320

- Let the learners study what has happened now. They should be able to tell you that when we multiply by 20, we double the number and add a zero.
- Repeat with other multiples of 10, e.g. 30, 70, until the learners have grasped the shortcut rule.

• Give the learners in their groups a sum such as the following to work out. They must not use calculators. Tell them you want them to write the answer underneath as they have been shown before when using the column method.

	8	7
x	7	0

- Walk around and check each group. Their sum should look like this:

		$^{4}8$	7
	x	7	0
6	0	9	0

NOTE: Learners often make the mistake of adding the 4+8, then multiplying. This is the incorrect order of operations. Be on the look out for this mistake.

- Once all the groups have finished, go through the sum step by step. Let the learners participate by you asking them what we do. First, we put down a zero because we are multiplying by 70. Then we multiply each digit by 7, starting with the units. 7x7=49. Put down the 9 and carry the 4 to the 10s column. Multiply 7x8 (56) and then add the 4 (60). Make sure the numbers are lined up in columns. Do NOT let the learners do something like this:

	$^{4}8$	7
x	7	0
60	9	0

- Let the learners in their groups do another two to three sums. Each time, check that they are writing down the zero, multiplying before adding when they carry over, and writing the digits in columns.

Consolidation (15 minutes)

• Give the learners as many examples as possible to practise this concept. They can do the exercises individually in their workbooks. You can write the exercises on the board. Walk around and check the learners' methods. Identify any learners who are not doing the work correctly, and help them in a small group.

Problem Solving (15 minutes)

• Find problems in the textbook for learners to solve. These problems can include all the operations to reinforce and give the learners practice in work taught this term.

ASSESSMENT	**Informal :** Assess the learners' grasp of this concept from their verbal responses, participation in class and their written work.

WEEK 8: Day 2

Notes to the teacher:

- Now that the learners have hopefully grasped the concept of multiplying by multiples of 10 in columns, this lesson will extend that knowledge to multiplying 2-and 3-digit numbers by 2-digit numbers in columns.
- Constantly remind the learners that any number multiplied by zero is zero.
- Keep checking that when the learners have to "carry over" a number from one column to the next, they multiply before adding.
- Revise vocabulary of multiplication: times, multiply, product.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 20 examples to do that involve multiplication by multiples of 10. Say the examples. The learners should write down the answers only. For example:
  - 4x20 8x30 15x30 20x30 18x20

Concept Development (25 minutes)

- Write an example such as this on the board: 75x23. Ask the learners to work this out using the 'breaking-up of numbers' method:
  - 70x20=1 400
    70x3=210
    5x20=100
    5x3=15 1 400+210+100+15=1 725
  - Check with the learners – we multiplied 4 times, as we have to multiply each digit in each number by each digit in the other number, remembering the place value of each digit. When we multiply in columns, it is exactly the same. Do an example with the learners on the board, asking questions so that the learners have to think what to do:

		$^{1}7$	5
	x	2	3
	2	2	5*
1	5	0	0**
1	7	2	5***

The method the learners must help you with:

*Start with the units. 3x5=15. Put down the 5, carry 1 to the 10s column. 3x7+1=22. Write this down in columns.

**Move to the 2 part of 23. What is the value of the 2? 20. What do we do when we multiply by 20? Put down a zero. Where do we put it? Under the units column.

2x5=10. Put down the zero, carry 1. 2x7+1=15.

***Add in columns, starting with the units

- Give the learners another similar example to work out in their groups. Walk around the class, guiding them. Afterwards, let someone from a group which did the example correctly come and do the example on the board. As the learner does the example, let him/her explain what he/she is doing, and you also explain.
- Repeat with as many more exercises as you feel necessary to ensure that the learners are multiplying in columns correctly and confidently. Each time, let the learners work an exercise out in their groups, then afterwards, go through the method slowly and clearly. The learners must be active participants in this lesson, not just passive listeners.

• Challenge the learners in their groups to multiply a 3-digit by a 2-digit number. Give the first group to complete it correctly a reward. Go through the method with them. If they have grasped multiplying two 2-digit numbers, it will not be difficult for them to multiply a 3-digit by a 2-digit number. However, it is important to go through the method with them, after they have worked out the exercise in their groups, several times.

Consolidation (15 minutes)

• The learners can do 8 to 10 exercises, individually in their workbooks, to practise multiplying in columns. Walk around the class and identify the learners who are having difficulty and help them in a small group.

Problem Solving (15 minutes)

• Set problems such as the following. Learners must write an open number sentence, do the calculation in columns, and make sure that their answers are complete (Rands, cattle, ships etc). They can check their answers using their calculators.

- There are 48 rows of chairs in the hall. In each row, there are 28 chairs. How many chairs are in the hall?
- The egg supplier delivered 96 boxes of eggs to the supermarket. Each box contained 2 dozen eggs. How many eggs were there altogether?
- Soccer fans went to the Bafana Bafana match in 32 buses. There were 54 people on each bus. How many soccer fans went to the match by bus?

ASSESSMENT	**Informal :** Check the learners' books to make sure they are able to multiply in columns.

WEEK 8: Day 3	
Notes to the teacher: • The learners have had practice in multiplying using a variety of different methods and a variety of numbers containing different numbers of digits. • In today's lesson, we will briefly revise multiplying a 4-digit by a 1-digit number. You can then give them a variety of different multiplication problems and use this as part of an Assessment Task. They will also need to be assessed on multiplication with other operations in a problem solving context to ensure that they can choose and use the correct operation **Resources:** Chalkboard, prepared multiplication exercises and problems for Assessment Task.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Practise multiplying by multiples of 100. You can say 20 exercises and the learners write down the answers only, or make it a competition between the groups (make sure every learner gets a turn to answer). Examples: - 3x100 17x100 3x200 12x400 9x600 **Concept Development** (10 minutes) • Revise multiplying a 4-digit by a 1-digit number. This was done in Week 3 Day 1. You can choose how to do this. One idea is to write an example on the board and let 4 or 5 different learners come and do it on the board (which you have divided into columns to give each learner his own working space), then discuss each of their methods afterwards. Otherwise you can give the learners an example to work out in their groups and then let a learner from one or two groups do the example on the board, showing his group's method. Avoid doing all the talking, the learners must participate and think about the methods they use. **Consolidation** (25 minutes) • The learners must work on their own to do at least 10 multiplication exercises. If possible, have these on a printed worksheet. If you cannot do this, write them on the board. **Assessment Task** (15 minutes) • Give the learners about 5 problems entailing multiplication to solve individually in their workbooks. You can include 2- or 3-digit multiplied by 2-digit numbers as well. Make sure the learners write a number sentence, show their working out and write complete answers (cows, people, etc)	
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 8d: Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiplication of at least whole 4-digit numbers by 1-digit numbers • LO 1 AS 10a: Use a range of techniques to perform written and mental calculations with whole numbers including multiplying in columns.

WEEK 8: Day 4

Notes to the teacher:

- Today's lesson is revision of dividing 4-digit by 3-digit numbers which was taught in Week 3 Day 2.
- Today's lesson will include problems which have remainders.
- Division is repeated subtraction. Learners will use this fact to divide, but must try to subtract as large a number as possible each time.
- Division is the inverse (opposite) of multiplication. Learners will check the answers to their exercises by multiplying.
- Division is not commutative, i.e. $42 \div 3 \neq$ (does not equal) $3 \div 42$.
- Today's work can be assessed as part of Assessment Task 2. However, it is necessary to re-assess division in an assessment which contains problems using the different operations so that you can see that the learners know which operation to use.

Resources: Chalkboard, worksheets (assessment task)

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some Running Maths, include all four operations, doubling and halving.
- Give the learners 10 exercises to work out in their heads. Say the exercises, the learners write down the answers only. For example:
  - There are 34 learners in the class. How many fingers and toes altogether in the class?
  - There are 4 dogs and 5 cats. How many legs altogether?
  - I bought 2 dozen eggs. $\frac{1}{8}$ of them were cracked. How many eggs were cracked?

Concept Development (20 minutes)

- Give the learners a problem to solve in their groups. Walk around and observe their methods. See if they remember to subtract as large a number as possible each time. A problem can be: *8 450 people were at the local soccer match. They sat in stands which could accommodate 325 people. How many stands were in the stadium?* After the groups have finished, let a learner from a group that got the problem correct with a refined method come and do it on the board.
  - Remind the learners that it is always advisable to write down a few multiples of the divisor, using doubling and halving:

325x1=325

325x2=650 (double above)

325x10=3 250

325x20= 6 500 (double above or add 0 to 650)

325x5=1 625 (halve answer to x10)

- Look for the biggest number to subtract from 8 450:

8 450-6 500	=1 950	(x20)
1 950-1 625	=325	(x5)
325-325	=0	(x1)
		20+5+1=<u>26 stands in the stadium.</u>

- Ask the learners how to check this answer. They can use their calculators using division: 8 450÷325. Another way is to multiply the answer, 26, by the divisor, 325. 325x26=8 450. Therefore their answer is correct.
- Now give the learners a problem which will have a remainder. Let the learners work it out in their groups. An example: *KwaZulu-Natal has 9 295 electricity poles that they have to transport. One truck can transport 125 poles. How many trucks will be needed to transport all the poles?*
- After the learners have had time to solve this in groups, go through the problem with them on the board. The answer to the problem is 74 remainder 45. Tell the learners to look at the question again – it asked how many trucks will be needed to transport **all** the poles. The 45 poles (the remainder) cannot be left behind, so another truck is needed. Therefore, 74+1=75 trucks will be needed.
- Learners must be encouraged to always go back to the problem to see what was asked, and to see whether they answered the question that was asked.
- How can we check this answer by multiplying? 74 (the answer/quotient)x125=9 250. After multiplying, add the remainder: 9 250+45=9 295. Our answer is correct.
- Do a few more simple examples of dividing to practise checking by multiplication: e.g. 47÷5=9 rem2. Check: 9 (quotient)x5 (divisor)=45. Add the remainder: 45+2=47.

Consolidation (15 minutes)

- Give the learners 4 to 5 division exercises to do on their own in their workbooks. Use these as part of formal assessment. The learners can check their answers by multiplying on the calculator.

Problem Solving (15 minutes)

- Learners must solve 4 to 5 problems using division of a 4-digit number by a 3-digit number. Include problems which have remainders. Ensure that the learners show their working and write complete answers (trucks, stands, etc).

ASSESSMENT	**Informal:** Observe the learners' verbal responses and their workbooks to make sure they understand the concept of dividing 4-digit by 3-digit numbers.

WEEK 8 : Day 5

Notes to the teacher:

- The focus of today's lesson is on order of operations. Although it is being revised as a lesson, the learners should be constantly reminded about the correct order of operations and given problems which include mixed operations.
- From a young age, we are taught to read and write from left to write. Therefore, when learners have an exercise to do, they naturally want to work from left to right. Before just forging on, they must check for mixed operations and work in the correct order.
- This is one of the facets of maths that has to be learnt. The word BODMAS is made from the first letter of the correct order of operations: Brackets, Of, Divide, multiply (work from left to right), Addition and Subtraction (work from left to right).

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some times table drilling/practice.
- Give the learners 10 number patterns to complete in their books. Examples:
  - 15; 21; 27; 33; …….; …….; ……
  - 5; 15; 24; 32; 39; 45; ……; …….; ……..
  - 92; 84; 76; 68; …….; ……..; ……..

Concept Development (15 minutes)

- See if learners remember the order of operations from the first term. Give them the following 3 examples to work out. Before they start, tell them to look carefully: 12+8x3; (12+8)x3; 12+(8x3)
  - Ask them which two examples have the same answer. The first and the third. Ask them which example does not actually need to have brackets – the last one. Go through the first example: we have to multiply first, and then add. 8x3=24. 24+12=36. In the second one, we work out what is in the brackets first, 12+8=20. 20x3=60. The third one has the same order of operations as the first, so the answer is 36.
  - Write the word **BODMAS** in large letters on the board. This word reminds us of the correct order of operations: B stands for Brackets, O for Of, D for Divide, M for Multiply, A for Add, S for Subtract.
  - Emphasise that in the above word, divide comes before multiplication, but if you have those two operations in an exercise, you work from left to right. Divide is not done before multiplication; they have the same "strength". 5x8÷10=4. Work from left to right. Involve the learners by asking questions and getting them to tell you what to do and work out the answers.
  - Do a few examples on the board. Similarly, emphasise that when we have only addition and subtraction in an example, we work from left to right, e.g. 6-4+12=14. Do a few examples on the board.

- Do a few examples with mixed operations. Ask learners to come to the board one at a time to work out sums such as the following. As a learner finishes an exercise, ask a few learners around the class if they agree with the answer. For example:
  28+12÷6 (=30)
  40÷8x12+ 6 (=66)
  3x4+5x5 (=37)
  35+12÷4x5 (=50)
  (18+12) ÷3 +3 (=13)

Consolidation (15 minutes)

- Give the learners as much practice as possible doing calculations with mixed operations. If they have a non-scientific calculator, they can use this, but they must write down what they enter in the calculator (a scientific calculator automatically does the correct order of operations). You will find examples in textbooks. If you cannot, make a worksheet or write exercises on the board.

Assessment Task 2 (15 minutes)

- Give the learners problems that entail calculating with and converting between different units of Time.

ASSESSMENT	**Informal:** Check the learners' books to ascertain whether they are competent in doing operations in the correct order.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO4 AS2: Solve problems involving calculation and conversion between appropriate time units including time zones and differences.

Grade 6: Week 9

Hours: 5	**Number of Periods: 5**
Mathematics LO 4 AS 4a, 4b, 5, 6b	**Milestones:** • Estimate, measure, record, compare and order 2-dimensional shapes and 3-dimensional objects using SI units with appropriate precision for - Mass (grams and Kilograms) - Capacity (millilitres and litres) • Solve problems involving selecting, calculating with and converting between appropriate SI units listed above. • Use of appropriate measuring instruments to appropriate levels of precision including: - bathroom scale, kitchen scale and balances to measure mass - Measuring jugs to measure capacity.

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:	Revision of any work necessary	Assessment Task 2	Measurement: Mass and Capacity	Measurement: Mass	Measurement: Capacity
Resources	Textbooks, revision worksheets, chalkboard.	Prepared Assessment Task	Textbooks, worksheets, chalkboard, measuring cups and spoons, scales, empty cold drink bottles.	Textbooks, worksheets, chalkboard	Textbooks, worksheets, chalkboard

WEEK 9: Day 1	
Notes to the teacher: • In today's lesson, revise any of the concepts in which the learners are not very competent. • You will know what to revise from your informal assessment of the learners over the past few weeks. • Tomorrow's lesson will be used for Assessment Task 2, so make sure the learners get enough practice in calculations and problem solving to ensure they are able to write the Assessment task with confidence. **Resources:** Prepared worksheets, chalkboard, textbooks.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Do some "Running Maths" with adding, subtracting, multiplication, dividing, halving and doubling. • Give the learners a prepared speed test with 20 random multiplication table exercises. **Revision – Calculations and concepts** (30 minutes) • Give the learners revision work. What you give them will depend on what area you feel they need practice in. You could even give different groups of learners different work, depending on their needs. It is important that you work with learners in small groups to help them with this work. Revision could include: - Fractions and Mixed numbers – adding and subtracting; - Recognising and comparing decimal fractions to 1 decimal place; - Adding and subtracting decimal numbers to 1 decimal place; - Multiplying 2-digit by 2-digit numbers - BODMAS - Place value of 7-digit numbers - Rounding off and compensating. **Revision - Problem Solving** (20 minutes) • Set the learners problems to solve using as many of the above concepts as possible. They must always write a number sentence. Some problems can entail use of the calculator.	
ASSESSMENT	**Informal :** This revision time will help you to see if there are any gaps in the learners' knowledge.

WEEK 9: Day 2

Notes to the teacher:

- Today's lesson will be used to write a test on concepts not formally tested for Assessment Task 2.
- Learners must work alone to do the task.

Resources: Prepared Assessment Task which must meet all the requirements listed for AT 2.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some multiplication times table practice. You can play Tables King (see Addendum), do Clock Multiplication, or ask different learners in turn the say the answer to a times table question as quickly as possible.

Assessment Task 2 (50 minutes)

- Learners must complete this task, which you have prepared, alone and in their workbooks or on paper to be pasted into their workbooks.

ASSESSMENT	**Formal, recorded Assessment Task :** • **LO 1**: Recognise the place value of - As 4a whole numbers to a minimum of 7-digit numbers - AS 5b decimal fractions to at least 1 decimal place. • AS 6a: Solve problems in context such as financial (profit and loss) • Solve problems that involve: - AS 8c addition and subtraction of Mixed numbers - AS 8h: addition and subtraction of positive decimals with at least 1 decimal place - AS 8j: multiple operations of whole numbers with or without brackets • AS 10a: calculate by multiplying in columns. • **LO 2** AS 4: Write number sentences to describe a problem situation within a context. • **LO 4** AS 5: Solve problems involving selecting, calculating with and converting between appropriate SI units of Length and temperature.

WEEK 9: Day 3

Notes to the teacher:

- Today's lesson focuses on Mass and Capacity. It will be a general introduction to these two SI units.
- We usually only use units of capacity to measure liquids. However, many recipes call for millilitre measurements of flour, sugar, baking powder, cocoa, etc. These are products that can be poured, so we can say we can measure anything that can be poured in millilitres and litres.
- Use the abbreviations for grams (g), kilograms (kg), litres (l) and millilitres (ml) in any calculations or conversions between units.
- It is useful to know that 1ml of water = 1 gram and 1 litre of water = 1 kg. The learners do not need to know this conversion, but it is worth mentioning. This equivalence does not apply to all liquids; some are denser so have a greater mass than water.

Resources: Chalkboard, textbooks, worksheets. Measuring jugs and spoons, empty 1 and 2 litre cold drink bottles, kitchen and bathroom scales, recipe (can be written on the board). Water.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some counting activities. You can let the learners count individually, you can count going around the class, group by groups (girls, then boys, 10-year olds, 12 year olds, etc). Count backwards and forwards. Do not always start at zero. Counting can include:
  - Counting in whole numbers – multiples and non multiples (e.g. in 11s from 28 to 120)
  - Count in fractions and mixed numbers
  - Count in decimals.

Concept Development (25 minutes)

- Write the following recipe on the board or give each pair of learners a copy.

FRED'S FRUIT PUNCH
(makes about 25 x 250ml glasses)

500ml water
2 litres soda water
500g white sugar
750ml orange juice
500ml apple juice
1 litre apricot juice
350ml pineapple juice
1 litre ginger ale
200g chopped apples
400g chopped pineapple

If you have the facilities and the learners can bring the ingredients, you could make this in class. It would be good practice in actual measuring.

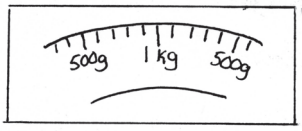
- Ask the learners to write down (or underline if you gave them a printed copy) all the items whose *capacity* is measured. They can write these items down in descending order (from most to least).
- After enough time, ask several learners to read out one or two items. Ask as many questions as you can about the units of capacity, such as: What does the *ml* stand for? What does litres mean? How many ml in a litre? Ask questions about doubling and halving: If I want to double this recipe, how much pineapple juice will I need? If I halve this recipe, how much orange juice will I need? Ask questions such as: I had to buy a litre of orange juice. How much orange juice do I have left? Ginger ale comes in $1\frac{1}{2}$ litre bottles, how many ml of ginger ale didn't I use?
- Tell the learners you have three bowls in which you could make this punch. The bowls have a capacity of 2 litres, 4 litres and 7 litres. Which bowl would be most suitable?
- Show the learners your measuring jugs. Ask learners individually to show you on the measuring jug which mark the pineapple juice would reach if you used the jug to measure it. Do the same with other ingredients.
- Show the learners the empty 1 and 2 litre cold drink bottles. Ask questions about the ingredients, referring to the bottles, e.g. which bottle did I buy the soda water in? If I don't have a measuring jug, how could I use the litre bottle to measure the water (make it about half full).
- Tell the learners there are some ingredients in the recipe that you haven't discussed yet. What are they, and in what unit are they measured? What does the g stand for? What are we measuring? (We are measuring their mass). Ask questions such as what is the total mass of these ingredients – is it more or less than 1 kilogram? How many grams in a kilogram?
- Ask questions about doubling and halving.
- Show the learners the kitchen scale. Let them see what mass each small division shows (this is seldom less than 10g, depending on the size and calibration of the scale).

• Ask the learners if they know how heavy something with a mass of one gram feels. For example, does an eraser, a sharpener, a pencil have a mass of 1 gram or more? They will all be more than 1 gram.

- Show the learners the 1ml measuring spoon. Fill this spoon with water and pour it into a learner's hand. Ask him if he feels anything apart from the wet and cold of the water? It is so light, he would not feel it. Repeat with more learners. Tell them that 1 ml of water has the mass of 1 g. What would the mass of 1 litre of water be? (If you do not have a 1 ml spoon, a teaspoon will be fine. A teaspoon is 5 ml, so estimate how much water would equal 1 ml or let the learners feel the mass of 5 g).

Consolidation (15 minutes)

- Textbooks usually have diagrams of scales for learners to practise reading mass.
  - Find examples. (If you cannot find any, draw simple pictures, such as the following. You would need several, some with arrows pointing to a mass for learners to read off the mass, some blank for learners to fill in the arrow to show a given mass):
  - Ask learners questions such as: how many grams does each small division represent? Fill in an arrow to show 1 100 g, 750 g, etc. What mass is shown on the scale?



  - Repeat the above with pictures of measuring jugs.

- Let the learners have practice in actual measurement, particularly of mass. Make sure that when they measure, their eyes are in line with the gradations. Let them fill in a table such as the following, or find a similar example in the textbook. This table contains only a few examples. You can do many more:

Item	Measure in g, kg, ml or l	Estimate	Actual (where possible and practical)
Shoe			
Board eraser			
The capacity of a car's petrol tank			
The juice in my school lunch bottle			

ASSESSMENT	**Informal :** Observe the learners to see how well they participate in class, how well they respond to questions and how well they do their written work. This will give you insight into how well they can measure, estimate and compare.

WEEK 9 : Day 4

Notes to the teacher:

- Earlier in the term, the learners converted between units of length. If they are competent in converting between metres and kilometres, they should not have difficulty converting between grams and kilograms. At this stage, the learners need only know these two units of mass.
- It should not take long to revise converting between the two units (the learners also learnt this in Grade 5). This will give the opportunity for more practice in problem solving.
- This lesson integrates Maths with NS and technology.

Resources: Chalkboard, textbooks, worksheets

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Add on to make a total (or totals) of your choice. Give the learners 20 mental calculations to do. You can write these on the board or have printed papers for them to work on. e.g. 2 000:
  - 1 257+□=2 000 (10 of these)
  - Choose the two numbers which total 2 000: 586; 1 324; 1 424; 1 755; 345 (10 of these).

Concept Development (15 minutes)

- Practise converting between g and kg, and vice versa. Give the learners in their groups an order that you gave the butcher, and his delivery note. Ask groups of learners in turn questions (such as the examples below – think of many more). Make this a competition, keep score and give the winning team a reward.

ORDERED FROM THE BUTCHER	
900g	Mince meat
450g	Pork chops
2kg300g	Chicken pieces
1 850g	Flank
480g	Chicken livers
1kg700g	Lamb neck
850g	Sausages

WHAT THE BUTCHER DELIVERED	
870g	Mince meat
500g	Pork chops
2kg235g	Chicken pieces
1 850g	Flank
520g	Chicken livers
1 750g	Lamb neck
900g	Sausages

  - Did I order and receive more or less than a kg of mince? How many grams more or less than a kg did I receive?
  - What is the difference in grams between the amount of chicken pieces I ordered and what the butcher delivered?
  - How many grams of lamb neck did I order?
  - How many grams and kilograms of lamb neck were delivered?
  - If I'd ordered double the amount of pork chops, would this have been more or less than a kilogram? How much more or less?

- Which meat did the butcher send that was the same amount that I ordered? How many kg and g does this equal?
- Round off the mass of the sausages (chicken pieces, lamb neck) to the nearest kilogram (500g, 1 000 g)

- Ask the learners if they remember how to convert between metres and kilometres. Write a few examples on the board and let individual learners come to the board and write the conversions on the board. Tell them converting units of mass is exactly the same. Give learners the opportunity to do some conversion of units of mass on the board. The rest of the class can check on them and try to spot any mistakes. Do as many examples with the learners as you think is necessary for them to convert competently.

Consolidation (15 minutes)

- Give the learners who understand this work exercises to do while you help any learners who are still having difficulty with conversions of g and kg. Look for examples in textbooks, make a worksheet, or write them on the board. These must include several examples of each of the following (and any others you can think of):
  - Choosing the correct approximate mass: A horse will have a mass of approximately: 500g, 500 kg, 50 kg, 5 kg, 50 g
  - Arranging masses in ascending or descending order: 1 kg 450 g; 1 249 g; 875 g; 1 kg 23 g
  - Adding and subtracting different units of mass: 3 kg 750 g + 980 g + 14 kg 225 g. Answer in grams. Answer in kilograms and grams. 3 kg – 1 kg 123 g. Answer in grams.
  - Rounding off to the nearest 50g, 1 000 g, kilogram, 10 kilograms.

Problem Solving (20 minutes)

- You should find suitable problems in the textbook. If you don't, make a worksheet or write problems on the board. Allow learners to use their calculators for some of the problems. Ensure that they always write a number sentence and that their answers are complete. Make the problems of varying difficulty and use all the operations (or combination of operations). Examples of problems:
  - My mother bought 450 g of rice, 1 kg 367 g of potatoes, $2\frac{1}{2}$ kg of sugar, and $\frac{3}{4}$ of a kilogram of margarine. What was the total mass of her shopping?
  - Three people want to get into a lift which can carry 700 kg. The mass of each of the 3 people is 87 kg, 102 kg 600 g and 95 kg 700 g. They each have a suitcase with a mass of 23 kg. How many more kg can be safely carried in the lift?
  - Ms Slim went to a club to lose weight. She lost an average of 660 g a week for the first five weeks, then an average of 1 kg 220 g for the next three weeks. If her starting mass was 87 kg, what was her mass after these 8 weeks?

ASSESSMENT	**Informal:** Mark the learners' books to see that they grasp this concept.

WEEK 9: Day 5

Notes to the teacher:

- Earlier in the term, the learners converted between units of length. They have also had practice in converting between g and kg. If they have mastered these conversions, they should not have difficulty converting between millilitres and litres. At this stage, the learners need only know these two units of capacity.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some division practice. Use the "Clock multiplication" method (see Addendum). After a few rounds with different divisors, give the learners about 10 division exercises to complete. You can call out the exercises and they write down the answers.

Concept Development (15 minutes)

- Tell the learners that as part of a community project to save water, each house was given a device to fit on the tap to measure how much water they used. One morning, Ms Themba wrote down the following amounts:

Flushing toilet	3 litres 250 ml
Washing face	750ml
Brushing teeth	100 ml
Water to make porridge	1 020 ml
Water to fill kettle for tea	1 litre 500 ml
Washing dishes	8 litres 520 ml
Shower	18 litres
Washing clothes	24 litres
Washing hands	950 ml
Watering garden	65 litres

- Ask the learners to convert all the above to millilitres and arrange them in ascending (from smallest to largest) order.
- Learners from each group can give their answers and tell the class how they worked them out.
- Ask questions that individual learners can answer, such as: How many more ml of water would Ms Themba have needed to fill her kettle if the kettle holds 2 litres? If Ms Themba is allowed 400 litres of water each week for her garden, will she be able to use 65 litres every day? If everyone in her family of four people used the same amount of water for everything, how much would they have used in total, in litres, to wash their faces and brush their teeth?

- Tell the learners that later in the day, Ms Themba wrote down the following amounts of water used (think of more examples if you wish, but write them all in ml):

Washing the floor	7 146 ml
Making soup	2 158 ml
Making orange juice	1 580 ml

Ask the learners in their groups to convert these amounts to litres and millilitres. Individual learners can come to the board and write down their answers. Let them explain how they worked them out.

Consolidation (15 minutes)

- Give learners a variety of conversions and other exercises to do, similar to those done in the lesson on Mass (Week 9 Day 4).

Problem Solving (20 minutes)

- If you cannot find suitable problems in the textbook, you can make a worksheet or write problems on the board. Allow learners to use their calculators for some of the problems. Ensure that they always write a number sentence and that their answers are complete. Make the problems of varying difficulty and use all the operations (or combination of operations).

ASSESSMENT	**Informal:** Gauge from the learners' verbal responses, participation in class, and written work whether they can work in units of capacity.

Grade 6: Week 10

Hours: 5	**Number of Periods: 5**
Mathematics LO 4 AS 3 **LO 3 AS 4**	**Milestones:** • Describe and illustrate ways of representing time in different cultures throughout history • Use the vocabulary and properties of rotations, reflections and translations to describe relationships between 2-dimensional and 3-dimensional objects (including transformation and symmetry).

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:	Representing time through the ages	Recognising translations, rotations and reflections in shapes	Revision	Time through the ages	Time through the ages
Resources	Books and information obtained from the internet	Chalkboard, worksheets, cardboard templates of shapes, square paper. Large cardboard template of an isosceles triangle.	Chalkboard, textbooks, worksheets.	Books and information obtained from the internet	

WEEK 10 : Day 1

Notes to the teacher:

- During today's lesson, you must divide the learners into groups with an equal distribution of ability within the different groups.
- Each group will research a different aspect of "Representing Time through the Ages". It is advisable that you give the different topics to the different groups – or let them choose out of a hat.
- You will need to give the learners support and guidance in their research. Often information from books or the internet is written in such a way as to make it difficult for learners to understand it.
- The learners must find more information at home and bring this and cardboard or whatever they require to school later this week (Day 4) to work as a group on this research.
- On Day 5, the learners must present their research to the rest of the class.

Resources: Information on "Representing time through the ages" – see Addendum for some internet sites. Enough prepared topics for each group in your class to be given a different topic

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Fractions of whole numbers. Give the learners 15 to 20 calculations such as:

  $\frac{1}{4}$ of 200 $\frac{3}{4}$ of 200

  $\frac{1}{5}$ of 250 $\frac{2}{5}$ of 250 $\frac{3}{5}$ of 250

Concept Development (20 minutes)

- Discuss with the learners how we represent and tell time nowadays. Discuss how the learners think people could read and represent time in the past, before there were watches, clocks and calendars.
- Tell the learners they are going to do research about representing time through the ages.
  - Divide the learners into groups of approximately 5 learners.
  - Give each group a topic, such as telling day and night, telling the seasons, recording the passing of days, water clocks, pendulum clocks, sundials. You can have the different topics written on a piece of paper which you fold and put in a container. The groups can then pick out of the container.
  - Give each group research material.
  - Tell the learners that they must use the research material to make an interesting oral presentation to the class later this week. They must not merely read the information.
  - Their presentation should include a poster. Either you can give them the cardboard or paper, or they must buy it, depending on circumstances.
  - They can make an activity for the class, e.g. a worksheet, word search or crossword puzzle. This is for you to decide.
  - Tell them to do some work on this at home. They can bring all they need to continue working on Day 4, and they will do their presentations on Day 5.

Research and Investigation (30 minutes) • Learners can sit in their groups and work on this task. - Walk around to each group to check that everyone is participating (there must be division of labour in the groups), help them understand the research material, and guide them as to how to make their presentation interesting.	
ASSESSMENT	**Informal:** There are no mathematical skills to be assessed this lesson. However, observing your learners when they do group work gives you insight into their personalities, leadership skills, co-operation and inter-action with peers.

WEEK 10: Day 2

Notes to the teacher:

- In Grade 5, learners were taught about transformations of shapes by translations (sliding), rotations (turning) and reflections (flipping). These movements are going to be revised in today's lesson.
- Learners will see that by moving shapes in the above ways, patterns can be made. They will make their own patterns.
- Learners need to know the vocabulary of transformation of shapes and use this vocabulary to describe how a pattern was made.

Resources: Chalkboard, worksheets, cardboard templates of shapes, square paper. Large cardboard template of an isosceles triangle.

DAILY ACTIVITIES

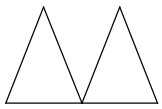
Oral and Mental Activity (10 minutes)

- Revise order of operations. Give the learners 20 sums and include sums with multiplication by zero. The learners can write the answers. Examples:
  - 0x12+8 12+9÷3 5x(8+4)-35

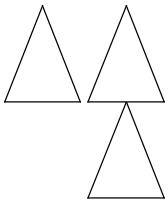
Concept Development (20 minutes)

- Divide the class into teams. Ask a member of each team in turn to come and draw a different polygon on the board to revise the names of the different polygons, e.g. equilateral triangle, hexagon, rhombus, octagon, trapezium, rectangle. To make sure as many learners as possible have a turn, you can also ask them to draw in the lines of symmetry on some of the shapes. They can also draw the shapes by you describing the properties of the shapes, e.g. "Draw a quadrilateral which has all four sides equal in length and 4 right angles". (This is a square) Add up the score to find the winning team and give them a reward.
- On the board, trace around the template you made. Hold the template away from the board..

  - Place the template next to the triangle on the board, and trace around the template again.

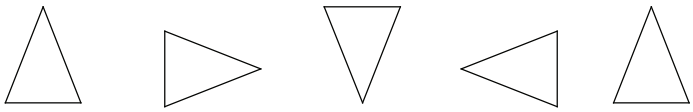


  - Ask the learners how you moved the triangle to make another triangle: you slid it. In Maths a slide is called a translation.
  - Draw another triangle by translation:



- Check that the learners agree that you translated (slid) the triangle again. It was not turned in any way, you slid it downwards. We can slide in any direction – upwards, downwards, sideways or diagonally.
- Get a few learners to come to the board and draw more triangles using translation.
- Do similar examples using other shapes.

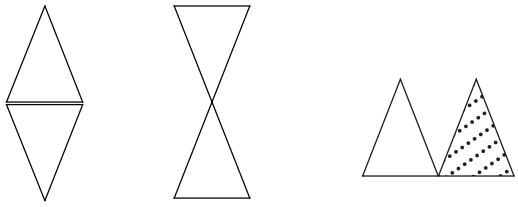
• Repeat the above, this time using the movement or rotation (turning). Do this clockwise through 90 degrees each time.



- Check that the learners see that the triangle looks different when it is rotated**.** Let them describe what you are doing – rotating the shape by 90 degrees.
- Do the same with another shape. Let learners take turns to draw the next shape in the pattern on the board.

• Move the triangle by reflection. This means that you flip it. When you flip a shape, you make a mirror image of it. We talk of our reflection in the mirror.

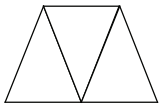
- You can flip the triangle In different ways:



Although this last reflection looks like a translation, it is a flip as the back of the second triangle is visible. Ask the learners to draw in the line of symmetry in each of the above.

- Do the same with another shape. Involve the learners by letting them come to the board to draw the shape.

• Sometimes we create a pattern by using two movements. See if the learners can identify the two movements in the following:



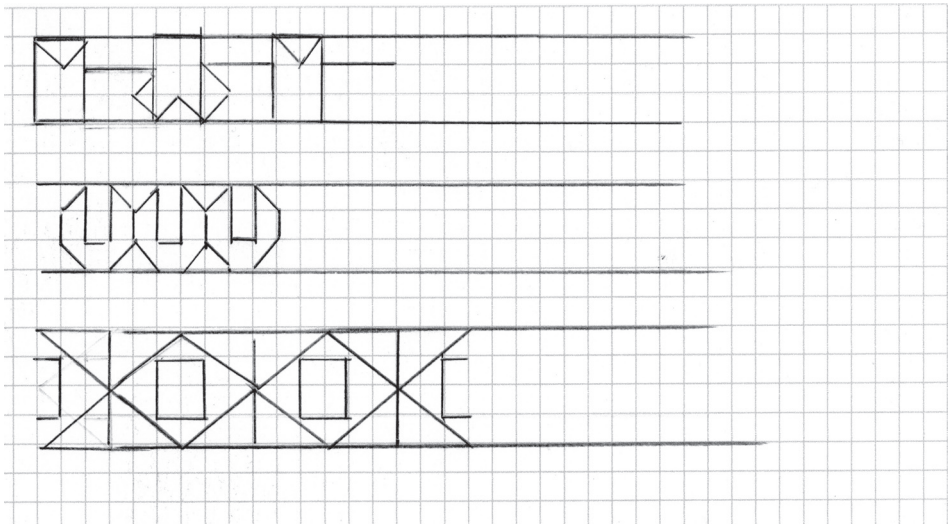
- We have used rotation and translation (turning and sliding). What shape has been made by two triangles together, formed by flipping about the shortest side? (A rhombus) What shape has been made by three triangles together? (A trapezium).

Consolidation (30 minutes)

• Give the learners square paper. Have three (or more) different patterns on the paper, the rest is blank.

- Learners must complete the patterns that you have made and write down in each case what movements have been used (or what combination of movements have been used).

- They can then create their own patterns using each of the three movements they have learnt about today. Each time, they must say what movement they have used.
- Examples of patterns you can make:



- Pattern 1 is rotating, pattern 2 is translating, pattern 3 is reflecting.
- Learners can colour in the patterns and paste them into their workbooks.

ASSESSMENT	**Informal:** Assess the learners' ability to recognise translation, rotation and reflection. See if they are able to continue a pattern.

WEEK 10 : Day 3	
Notes to the teacher: • Use today's lesson to revise. Revise any concepts that you feel the learners need more practice in. You could even give different learners different work to revise. You will know from their Assessment Task 2 and your informal assessment through the term, what needs practice. **Resources:** Textbooks, worksheets, chalkboard.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Revise changing Mixed numbers to Improper fractions and vice versa. Revise orally, and then give the learners 20 to 30 exercises to do. **Revision** (50 minutes) • Revise any concepts that need more practice. Find examples in textbooks or make your own worksheets. While the learners are working, work with small groups of learners who need assistance with any concepts.	
ASSESSMENT	**Informal :** This lesson will enable you to see if there are any areas of weakness to particular learners or the class as a whole.

WEEK 10 : Day 4	
Notes to the teacher: • Today the learners will work on their research and presentation on "Representing time through the ages" (Week 10 Day 1). • It is very important that you walk around, spending some time with each group to guide them in their work. • Ensure that the learners do not just copy information to read to the class without understanding it. It can be difficult for learners to re-write information in their own words; you will have to help them. • Guide the learners as to how to present their information in an interesting way. **Resources:** Research material.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Do some times table and division practice. Use "Clock multiplication". • Do some "Running Maths". **Group Work** (50 minutes) • The learners must work in their groups to prepare their presentation on "Representing time through the Ages". Take note of your role by reading and applying the guidelines in Notes to the Teacher (above)	
ASSESSMENT	**Informal :** Take note of your learners' social interaction and how well they co-operate with their peers.

WEEK 10 : Day 5

Notes to the teacher:

- Today the learners will give their presentations on "How time was recorded throughout the ages".
- After each group has done its presentation, give some positive feedback. You can tell them in which aspects there is room for improvement, but do this in a positive way.
- After all the groups have done their presentations, all the learners can complete the activities that the groups devised (if you asked them to do so).

Resources: Learners' posters and worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Tables king. Do two or three rounds of Tables king.
- Do a multiplication tables speed test. The learners must complete 10 multiplication exercises as quickly as possible.

Group Presentations (50 minutes)

- Each group of learners can do their presentations. After each one, you can ask the rest of the class questions to see how well they listened to the presentation.
- After all the presentations, the learners can do each other's worksheets or whatever activities they made for the class. If you did not ask them to do this, you could do a quiz (group competition) on the contents of the presentations, and give the winning group a reward.

ASSESSMENT	**Informal :** Listen carefully to the presentations and see which learners took the task seriously and did well.

Notes: