Foundations For Learning

Intermediate Phase Mathematics Lesson plans

Third term

Grade 6

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THIRD TERM OVERVIEW OF LESSON PLANS: GRADE 6 MATHEMATICS

	LO 1: NUMBERS, OPERATIONS AND RELATIONSHIPS	LO2: PATTERNS, FUNCTIONS AND ALGEBRA	LO 3: SPACE AND SHAPE	LO 4: MEASUREMENT	LO 5: DATA HANDLING
	MENTAL STRATEGIES ARE DONE EVERY LESSON				
WEEK 1	**AS 4,10, 12, 8** • Recognise the place value of digits in whole numbers to a minimum of 7-digit numbers • Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating • Recognise, describe and use the commutative, associative and distributive properties of whole numbers. • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiple operations of whole numbers with or without brackets.	**AS 4** • Write number sentences to describe a problem situation within a context.			
WEEK 2	**AS 5** • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators.	**AS 3, 3, 3.** • Determine through discussion and comparison, the equivalence of different descriptions of the same relationship or rule represented verbally, in flow diagrams, in tables.			**AS 1, 2, 3, 4** • Pose simple questions about own school and family environment and identify appropriate data sources. • Uses simple data collection sheet (tallies and simple questionnaires (with yes or no responses) to collect data. • Distinguish between samples and populations. • Organise and record data using tallies and tables • Examine ungrouped data to determine mode and median. • Draw graphs and interpret data including pictographs with many-to-one correspondence and keys.

WEEK 3	**AS 1, 5, 5, 6, 8** • Count forwards and backwards in decimals. • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators • Recognise and use equivalent forms of decimal fractions to at least 2 decimal places • Solve problems in contexts such as financial (accounts and discount) • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtractions of positive decimals with at least 2 decimal places.	**AS 1** • Investigate and extend numeric and geometric patterns looking for a general rule or relationships.			
WEEK 4	**AS 5, 5, 10** • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators • Recognise and use equivalent forms of decimal fractions to at least 2 decimal places. • Use a range of techniques to perform written and mental calculations with whole numbers.	**AS 4** • Write number sentences to describe a problem situation within a context		**AS 5** • Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement)	
WEEK 5	**AS 4, 10** • Recognise the place value of whole numbers to a minimum of 8-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including adding and subtracting in columns.				

WEEK 6	**AS 8** • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiplication of at least whole 4-digit by 2-digit numbers. **AS 10** • Use a range of techniques to perform written and mental calculations with whole numbers including long division.	**AS 4** • Write number sentences to describe a problem situation within a context.	**AS 7** • Draw and interpret sketches of simple 3-dimensional objects from different positions.		
WEEK 7	**AS 7, 8** • Solve problems involving comparing two or more quantities of the same kind (ratio) • 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 7** • Draw and interpret sketches of simple 3-dimensional objects from different positions		
WEEK 8	**AS 4, 8, 10** • Recognise the place value of digits in decimal fractions to at least 2 decimal places • Solve problems that involve division of at least 4-digit by 2-digit numbers. • Adding and subtracting in columns	**AS 4** • Write number sentences to describe a problem situation within a context.		**AS 5** • Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement)	**AS 4, 5, 6a (Assessment project)** • Organise and record data using tallies and tables. • Examine ungrouped numerical data to determine mode and median. • Draw graphs and interpret data including pictographs with many-to-one correspondence and appropriate keys.
WEEK 9	Revision and Assessment Task			**AS 3** • Describe and illustrate ways of measuring in different cultures throughout history, including informal measuring systems.	
WEEK 10	Revision				

THE ASSESSMENT FRAMEWORK: TERM 3 - GRADE 6 MATHEMATICS

	INFORMAL ASSESSMENT TAKES PLACE ON A REGULAR BASIS THROUGHOUT THE TERM					
FORMAL WEEK:	**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**
1	NO FORMAL ASSESSMENT					
2		**AS 8:** Solve problems that involve multiple operations of whole numbers with or without brackets. **AS 10:** Use a range of techniques to perform written and mental calculations with whole numbers including building up and breaking down of numbers, rounding off and compensating. **AS 12:** Recognise, describe and use the commutative, associative and distributive properties of whole numbers.				
3						**AS 5.** Examine ungrouped numerical data to determine mode and median
4	**AS 9:** Perform mental calculations involving addition, subtraction and multiplication (12x12). **AS 1**: Count forwards and backwards in decimals.	**AS 4:** Write number sentences to describe a problem situation within a context.			**AS 1**: Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement)	**AS 4** Organise and record data using tallies and tables **AS 6a** Draw pictographs and interpret data

5		**AS 5**: Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators and decimal fractions to at least 2 decimal places. **AS 6**: Solve problems in context such as financial (reading and interpreting accounts and discount) **AS 10**: Use a range of techniques to perform calculations with whole numbers including using a calculator	**AS 5**: Solve or complete number sentences by inspection or by trial-and-improvement, checking the solution by substitution; **AS 3:** Determine the different descriptions of the same rule or relationship represented verbally, in flow diagrams, by number sentences and in tables.			
6	NO FORMAL ASSESSMENT					
7	NO FORMAL ASSESSMENT					
8	**AS 9**: Perform mental calculations involving addition and subtraction **AS 9**: Perform mental calculations involving multiplication to at least 12x12					**AS 4**: Organise and record data using tallies and tables. **AS 6a**: Draw pictographs with many-to-one correspondence and appropriate keys.
9		**AS 4**: Place value of digits in whole numbers to 8-digit numbers **AS 4:** Place value of decimal fractions to at least 2 decimal places **AS 10:** Add, subtract and multiply in columns. **AS 10**: Long division. **AS 8:** Problems: addition and subtraction of mixed numbers. **AS 8:** Solve problems: multiplication (4-digit by 2-digit numbers) and division 4-digit number by a 2-digit number.	**AS 4**: Write number sentences to describe a problem situation within a context.	**AS 7**: Draw and interpret sketches of simple 3-dimensional objects from different positions.	.	
10	NO FORMAL ASSESSMENT					

Grade 6: Week 1

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 4,10, 12, 8 **LO 2 AS 4**	**Milestones:** • Recognise the place value of digits in whole numbers to a minimum of 7-digit numbers • Use a range of techniques to perform written and mental calculations with whole numbers including rounding off and compensating • Recognise, describe and use the commutative, associative and distributive properties of whole numbers. • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiple operations of whole numbers with or without brackets. • 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:	Place value of 7-digit numbers (Revision from Term 2)	Rounding off and compensating	Properties of numbers (Commutative, distributative, associative)	Revise adding and subtracting in columns, Order of operations (BODMAS). Write number sentences and solve problems.	Revise multiplying in columns, dividing 4 by 3-digit numbers, Order of operations (BODMAS). Write number sentences and solve problems.
Resources	Chalkboard, textbooks, worksheets Bingo Place Value Cards	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.

WEEK 1: Day 1

Notes to the teacher:

- The focus of today's lesson is on Place Value of digits in 7-digit numbers. Later in the term, this will be extended to 8-digit numbers, a requirement of the Assessment Standards.
- Always remind the learners that we use only 10 digits in our number system, i.e. 0-9. These digits change value according to where they are placed in a number.
- To fully understand place value, learners must have a great deal of practice in building up and breaking down numbers.
- Place value of 7-digit numbers was taught in Term 2, Week 1 Day 1. Today's lesson is revision of that concept.

Resources: Chalkboard, textbooks, worksheets, Place Value Bingo Cards (see Addendum, Mental Strategies).

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- To get the learners' brains working after the holidays, do some "Running Maths" (see Addendum for instructions).
- Give the learners ten sums. Say the sum and the learners write down the answers only. Examples:
  - What number is 10 more than 122?
  - What number is 10 times greater than 15?
  - I have 84 sweets. I share them between 7 children. How many sweets does each child get?
  - What must I add to 54 to make 100?
  - If my clock chimes every half hour, how many times will it chime in a day?

Concept Development (20 minutes)

- Write the information below on the board. Tell the learners these are population figures in the South African provinces.

Province	Population	Province	Population
Eastern Cape	6 912 315	Limpopo	5 028 320
Free State	2 911 580	Mpumalanga	3 549 216
Gauteng	9 678 028	Northern Cape	1 103 452
KwaZulu-Natal	9 950 286	North West	3 448 921
		Western Cape	4 805 512

- Have a competition between the groups in your class, or between boys and girls. Keep score. Ask questions about the numbers above. If it is a question which requires a written answer, the learner answering the question can write the answer on the chalkboard. Make sure that all the learners participate and get a turn to answer. You can ask an individual learner from the group to answer a question for 2 points. If he/she gets the answer wrong, the rest of the group can try to answer it correctly for 1 point. Think of and ask as many questions as you can. Examples:
  - Which province has the greatest population?
  - Which province has the smallest population?

- Say the population of Gauteng/Eastern Cape/North West/Western Cape in words.
- Which number has a zero in the Hundred Thousands place? (Ask several questions about different digits in different place values)
- Write the population of KwaZulu-Natal/Mpumalanga/North West in expanded notation.
- If 100 000 more people lived in Western Cape/Northern Cape/Limpopo, how many people would live in that province?
- If 20 000 fewer people lived in Gauteng, how many people would live there?
- The population of KwaZulu-Natal decreased by 40 000 this year. How many people now live in KZN?
- Which provinces have more than 5 million people? Say their populations in words.

• Play "Place Value Bingo". See Addendum (Mental Strategies) for instructions.

Consolidation (15 minutes)

• Find examples in textbooks, make worksheets, or write work on the board. This work should include:
  - Write down the number that is 200 more than 123 754; write down the number that is a million less than 5 698 473: Give 5-6 sums like that.
  - Writing 7-digit numbers in expanded notation. Give 3-4.
  - From numbers written in expanded notation, write down the number formed. Leave out some digits and write in random order. For example, What number is formed from: (5x1)+(7x1 000 000)+(3x10 000)+(2x100)+(6x1 000). Answer: 7 036 205. Give the learners 5 like this.
  - Arranging in ascending and descending order. Learners need to know these words. Give about 4 examples.
  - Writing down the value of the underlined digits. Give six of these. Example, What is the value of the underlined digit in 6 7<u>8</u>2 025.

Problem Solving (15 minutes)

• Give the learners 4 to 6 problems to solve that revise Term 2 work. Problems can entail all the operations that the learners learnt in Term 2.

ASSESSMENT	**Informal :** Make sure that the learners understand Place Value of digits in a 7-digit number. Observe their verbal responses and check their written work. Help learners who are still having difficulty with Place Value.

WEEK 1: Day 2

Notes to the teacher:

- Learners have been rounding off to the nearest 1 000, 100, 10 and 5 for quite some time and should be competent in this. However, rounding off does sometimes cause confusion when larger numbers are involved.
- In today's lesson, rounding off will be revised and extended to rounding off larger numbers.
- Rounding off should be practised regularly when doing calculations.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise Place Value. Write the following statement on the board: *There are 4 569 241 ants in the ant colony*. Write sums, based on that statement, on the board and the learners write down the answers, individually, in their workbooks. Each question is based on the original statement and does not follow on from the previous answer.
  - 30 000 ants are out scouting for food. How many ants are left in the colony?
  - The angry farmer sprayed and killed 5 000 ants. How many ants are left?
  - A million baby ants hatched out of their eggs. How many ants are in the colony?
  - A nearby ant colony has 20 000 more ants than this colony. How many ants are in the other colony?
  - Write the number of ants in the colony in expanded notation.
- In Term 2, the learners did some adding and subtracting19 and 99 by compensating. Give them 10 sums using this skill to answer as quickly as possible. Examples:
  - 458+99 269+19 487-99 384-19

Concept Development (30 minutes)

- Use the population figures that you wrote on the board yesterday for today's lesson.

Province	Population	Province	Population
Eastern Cape	6 912 315	Limpopo	5 028 320
Free State	2 911 580	Mpumalanga	3 549 216
Gauteng	9 678 028	Northern Cape	1 103 452
KwaZulu-Natal	9 950 286	North West	3 448 921
		Western Cape	4 805 512

  - Ask the learners to tell you the population of North West in words. Ask a few learners to repeat it. Tell them that the Premier of North West wants to know approximately how many thousand people live in his province. How can we help him? We need to round the number off to the nearest thousand. Which digit is in the thousands place? 8. Which digit is the one we must look at to see whether the number stays 8 000 or changes to 9 000? It is the digit to the right of the 8, which is a 9. 9 is bigger than 5, so the 8 in the thousands place goes up to a 9. To answer the premier's question, there are approximately 3 449 000 people in his province.

- Tell the learners to round off the populations of all the provinces to the nearest 1 000. They can do this in their groups. See which group finishes first. Go through all the rounded off numbers with them to check they are correct.
- Repeat by rounding off all the numbers to the nearest 100.
- Challenge the learners to see if they can apply their knowledge of rounding off to being able to round off to other place values. Tell them that they met a tourist from Italy who asked them approximately how many million people live in South Africa. What answer will they give the tourist? Give them a few minutes in their groups to work this out. Afterwards, discuss their methods and see which group came up with the correct answer. This is what they must do:
  Round off each number to the nearest million by looking at the digit to the right of the millions (the second digit in each of the above numbers), then add the millions. This will be: (7+3+10+10+5+4+1+3+5) million = 48 million (48 000 000).

> ☞ Do not spend too much time on this; the learners do not really need to know how to round off to the nearest million. However, it gives the learners a challenge to apply their knowledge. It will also give them greater understanding of large numbers which are used in our daily lives, such as in news broadcasts, newspapers, population figures and a country's wealth.

Problem Solving (20 minutes)

- Find problems in textbooks, make a worksheet or write problems on the board to give the learners practice in rounding off. Help any learners who have difficulty with rounding off. Examples:
  - There are 7 842 impala and 2 347 kudu in the game reserve. Round off these two numbers to the nearest thousand and calculate the approximate sum of and difference between the numbers of the two kinds of buck.
  - A new jet was purchased for R7 585 234. Approximately how many million Rand did the jet cost?
  - It costs R19 845 to build a simple house. Round off to the nearest thousand then calculate approximately how much will it cost to build 5 such houses.
  - At an IPL Cricket match, 3 456 spectators arrived in the morning. Another 4 897 spectators arrived in the afternoon. In the news that night, it was reported that approximately 4 000 people watched the match in the morning. What should have been reported? Approximately how many people watched the match that day?
  - Arrange the populations of the provinces of South Africa in descending order. Round off the two largest numbers to the nearest 100 000.

ASSESSMENT	**Informal:** Check the learners' class work. This will enable you to assess their skill in rounding off.

WEEK 1: Day 3

Notes to the teacher:

- Continuing with number work, today the lesson covers the properties of whole numbers.
- There are three properties that the learners need to know how to use. They do not need to know what they are called. These properties, along with rounding off and compensation, are important tools in making calculations easier for the learners.
- One of the properties is the Associative property, which means re-grouping 3 or more numbers. Associative is similar to the word association, meaning a group of people. We can re-group when doing addition and multiplication to make calculation easier. For example: 15+13+27. Instead of working left to right, calculating 15+13=28, then 28+27=55, insert brackets around any numbers which can be added or multiplied easily, like this: 15+(13+27)=15+40=55. This makes the calculation easier. Note: only addition and multiplication are associative.
- Another property is the Commutative property, which means changing the order of the numbers. Commute means to move (a commuter travels to work and back). This property applied only to addition and multiplication and can be summed up in this example: 4+8=8+4.
- The third property is the Distributive property, which means we can distribute multiplication over addition. For example 4x(3+2)=(4x3)+(4x2). Correctly, there should not be a x sign between the 4 and the brackets. It should be written: 4(3+2)

Resources:

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some adding. The learners can write the answers to sums you write on the board in their books. After enough time, let the learners swop books and mark each other's work. Discuss with the learners whether they say a short cut to or easy way of finding the answers. Examples:
  - 38+32+☐=90 (Change to 40+30 – compensating - = 70. 70+<u>20</u>=90)
  - 120+47+33=☐ (Add 47+33 first. Change to 50+30=80. 120+80=<u>200</u>)
  - 74+46=☐ (4+6=10, number bonds. Then add 70+40+10=<u>120</u>)
  - 182+178=☐ (Change to 180+180=<u>360</u> – compensating)
- Do some number pairs. On the board, write a total to be obtained by adding two numbers out of a row of 5 or 6 numbers. Learners must write down the two numbers from the row that make the given total. Example:
  - 1 000: 458 626 359 641 642. Learners write: 359+641=1 000

Concept Development (25 minutes)

- In their groups, give the learners addition and multiplication sums such as the following to complete:

15+19= ……..	19+15= ……..
127+63= ……..	63+127= ……..
5x12= ……	12x5= ……..
99+52= …….	52+99= …….
7x6= …….	6x7= ……
25x4= …….	4x25= …….
16+98= ……	98+16= ……
48+27= ……	27+48= …….

- When the groups have finished, ask them what they noticed. They should be able to tell you that they obtained the same answers, even though the numbers were in a different order. Do a few more examples orally, and then lead the learners to sum up with a general rule: *We can change the order of numbers when we add or multiply. The answer will be the same.*
- Give the learners an example of a subtraction sum. Ask them if 25-10=10-25. No, it does not. Do a few more examples, each time reaching the same conclusion. Sum up with a rule: we *cannot* change the order of the numbers when we subtract.
- Do the same as above with division. Ask the learners if 50÷10=10÷50. No, it is not the same. Check with the learners by doing a few more examples on the board whether this is true for all division calculations. Lead them to establish a rule: we *cannot* change the order of the numbers when we divide.

• Give the learners another set of calculations to do in their groups. This time they can calculate the answers each side of the ☐ and then replace the ☐ with = (equals) or ≠ (does not equal). The brackets show which numbers are grouped together. One must always calculate what is in the brackets first. If there are no brackets, work from left to right:

- 3x2x4 ☐ 3x(2x4)
- 6x4x25 ☐ 6x(25x4)
- 7+18+13 ☐ (7+13)+18
- 55+47+45 ☐ 47+(55+45)
- 15x6x2 ☐ (15x2)x6
- Discuss with the learners what they noticed. The answers are all the same. Ask whether they found any of the pairs of calculations easier than other. They should have found that by re-grouping, we can make a calculation easier.
- Explain to the learners that we can only do this with addition and multiplication and not with subtraction and division.

• Now do a few sums like the one below on the board with the learners. Involve the learners by asking them to work out parts of each sum. Firstly, explain that when we write a number before a bracket, it means we multiply what is in the brackets by the number outside the brackets. 4(3) means 4 *times* 3 (4x3)

- 4(3+5) (Add the numbers in the brackets – correct order of operations)
  =4x8=32.

The Distributive property (the learners do not need to know this word) allows us to work the sum out like this:

(4x3)+(4x5) (multiply each number in the brackets by the number outside the brackets)
=12+20=32 (add the two answers)

Learners have, in fact, been using this property when doing multiplication by breaking up the number. They have learnt that 6x32=(6x30)+(6x2).

Consolidation (15 minutes)

- Give the learners about 20 sums to complete in their workbooks to practice the commutative property (changing the order of numbers), simple addition and multiplication. Examples:
  - 15+36=36+…..=…….. (write the missing number and answer each time)
  - 48+56=56+……=……..
  - 12x9=9x…….= …….
- The learners can practise re-grouping to make calculations easier by doing about 12 sums such as the following:
  - 25x27x4. Learners re-group the numbers by inserting brackets the calculate the answer: (25x4)x27=100x27=2 700
  - 26+89+74
  - 5x12x30
  - 35+71+15
- Give the learners practice in using the distributive property in sums such as the following:
  - 8(16+4) = (8x….)+(8x….) = ……..+……. =
  - 6(7x9) = (6x…..)+(6x…..) = ……..+……..=
  - 7(5+9) = (…….x……..) = …….+……..=
  - 8(12+6) =…….=…….=
  - 9x32 = ……..

Problem Solving (10 minutes)

- Give the learners a problem to solve which revises rounding off, addition and subtraction.
  - These are the five longest rivers in the world:

Yangtze	6 300 km
Mississippi-Missouri	6 275 km
Amazon	6 400 km
Yenesei-Angara-Selenga	5 539 km
Nile	6 650 km

  - Arrange the rivers in order from longest to shortest.
  - Round off all the lengths of the rivers to the nearest 1 000 and nearest 100.
  - What is the total distance of the two longest rivers?
  - What is the difference in length between the longest and shortest rivers?

ASSESSMENT	**Informal :** Observe the learners' co-operation and participation in groups and check their written work to assess their understanding of the properties of numbers.

WEEK 1: Day 4

Notes to the teacher:

- Today we will practise and revise adding and subtracting in columns and the correct Order of Operations (BODMAS)
- Because Addition comes before Subtraction in the acronym BODMAS, learners tend to think they must add before subtracting. This is not correct. The rule says that if there is only addition and subtraction in a sum, we work from left to right.
- This week has been devoted to number work, looking for ways to make calculations easier, doing rounding off, estimating. Although these may have been taught as separate lessons, these skills should permeate all number work and be constantly revised and reinforced.
- Keep the numbers in today's lesson fairly simple. The focus is on practising adding and subtracting in columns and doing adding and subtracting as mixed operations from left to right.
- In all problem solving, make sure that the learners write number sentences and give complete answers (people, ships etc)

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Revise factors of numbers. Start off by asking the learners what a factor is. It is a number that divides into another number. All factors have a "partner". The factors of 12 are: 1, its "partner" 12 (because 1x12=12); 2 and its "partner" 6 (because 2x6=12); 3 and its "partner" 4 (because 3x4=12). Factors of 12 = 1, 2, 3, 4, 6 and 12. If the "partners" are the same, we only write down the number once. The factors of 4 are 1, 2 and 4. 2's "partner" is 2, we only write it once. Ask the learners in their groups to find all the factors of a few numbers e.g.:
  - 2; 14; 24; 30; 48; 60; 72
  - Choose any two numbers and ask the learners to circle any factors that are common to both numbers. For example, 5 is a factor of 5 and 5 is a factor of 30.
  - Add and subtract factor. For example, you can tell the learners to add the largest factor of 48 to the second largest factor of 30. Do several of these. The learners can write the answers in their workbooks.

Concept Development (20 minutes)

- Give the learners a problem such as: *There were 451 people on the train. 346 people got off at the first station and 479 boarded the train. How many people are on the train now?*
  - Divide your board into five columns and ask five different learners to come to the board and work out the problem. Each column on the board is a learner's working space. They must first write a number sentence.
  - After they have had a few minutes, let them stand back and show the class their working out.
  - Choose a learner who did the sum correctly, subtracting and adding in columns, to explain their method to the class. Repeat what the learner says so that all the learners can hear a clear explanation. This is what the learners should have done:
  - Number sentence: 451-346+479=☐ people (or, better if they used a letter instead of the ☐)
  - Because there is addition and subtraction only, work from left to right. If you add first, the number will be too large to subtract from 451.

Some learners might insert brackets. This is not necessary.

- The subtraction sum must be done in columns. Some learners might try to do the adding and subtraction in one sum. They must not do that. They will get confused.

4	54	$^{1}1$
- 3	4	6
1	0	5

Start with the units. 5+9=14. 14 = (1 Ten)+(4 units). Write the 4 in the units column and add the 1 Ten to the 7 in the Tens column. Carry on working from left to right.

- Before continuing, check by adding: Add 105 and 346. Answer is 451. Our answer is correct.
- Now add the passengers who boarded the train. This addition must be done in columns:

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

Start with the units. We cannot subtract 6 from 1. We borrow 1 (ten) from the Tens (which becomes 4) and add it to the units, making 11. 11-6=5. Continue working from left to right.

- Answer: 584 people were on the train.

- Do another problem with addition and subtraction in the same way, choosing different learners to work on the board. This time the learners can add before they subtract. *In January 2007, there were 687 learners in a school. In the second term, another 254 were enrolled. At the end of the third term, 178 learners left the school. How many learners were in the school in the fourth term?*
  - Go through the problem step by step afterwards. Ensure that the learners wrote a correct number sentence and did the calculations from left to right as they appeared in the number sentence. Make sure they do not try to add and subtract in one sum. Always check subtraction by adding. Make sure answers are complete.

Problem Solving (15 minutes)

- In their workbooks, learners can solve 4 to 5 problems that involve mixed operations (adding and subtracting of 3-digit numbers). Help learners who are having difficulty and ensure by checking on the learners as they work that they know:
  - How to write a number sentence
  - They must work from left to right, doing one calculation at a time
  - They must work in columns
  - They must check their answers: check subtraction by adding; check adding by adding from the bottom to the top.
  - Their answers must be complete.

Consolidation (15 minutes) • Give the learners four or more sums to do. These can be completed for homework. Examples: - 623+815-264 - 873-585+444 - 555-386+817	
ASSESSMENT	**Informal:** You will be able to assess the learners' grasp of these concepts by how some of them worked on the board, their verbal responses to questions you asked, and their written work.

WEEK 1: Day 5

Notes to the teacher:

- Today we will continue to revise BODMAS using mixed operations of multiplication and division.
- Similarly to Addition and Subtraction, if there is only multiplication and division in a calculation, we work from left to right. Even though the D for Division in BODMAS precedes the M for Multiplication, this does not mean we divide before multiplying. It means that we must multiply and divide before adding and subtracting.
- Learners will continue to do some problem solving which entails writing number sentences.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise multiplication. Firstly, ask learners different tables using clock multiplication (see Addendum for instructions). Thereafter give them a 5-minute multiplication speed test (see Addendum Term 2). Learners can swop and mark each other's work. See who gets the most correct.

Concept Development (20 minutes)

- Learners can work in pairs or small groups to see who can solve the following problem: *The builder had 360 boxes of 2 dozen (24) bricks. He can lay 180 bricks in an hour. How many hours would it take him to lay all the bricks?*
  - While the learners are working on the problem, walk around and check what they are doing. If any learners have not written a number sentence, tell them to do so.
  - Afterwards, go through the problem with them. Do the problem step by step on the board, but involve the learners by asking them what you must do next, the answer to parts of each sum and so on. Perhaps write a digit in the incorrect place and ask the learners if that is correct. Keep them involved. They must not be passive listeners.
  - Firstly, check that the learners have the correct number sentence: 360x24 ÷ 180=☐ hours (or a letter instead of the ☐ place holder). It is not necessary to insert brackets.
  - This calculation involves multiplication and division. Which do we do first? We work from left to right. If we try to divide first, we will be in a tricky situation, because we cannot divide 24 by 180 and get a whole number answer.
  - Go through the multiplication calculation step by step. The learners must be using the column method by now:

3	6	0	
x		2	4
1	4	4	0
7	2	0	**0**
8	6	4	0

Multiply each digit of 360, from the units to the Hundreds, by the 4. Write the answer in columns under the 24. Do not write two numbers in one column.
Multiply each digit of 360 by the 2 of 24. Remember that this 2 is actually 20, so we write down a zero first in the units column. Write the answer in columns on the line under the 1 440.
Add the two rows of numbers, starting with the units.

  - Ask the learners if our sum is now complete? No, we must still divide by 180. Remind the learners that dividing is repeated subtraction. We must try to subtract by as large as possible multiples of 180. Find some of these by doubling and re-doubling:

180x2=360 (double x1)
180x4=*720* (double above)
180x10=1 800
180x20= 3 600 (double above)
180x40=7 200 (double above)

8640-7200=1440	X40
1440-720=720	X4
720-720=0	X4
	40+4+4=48

- Is our answer complete? We must write the answer: He will take <u>48 hours</u>.
- Ask the learners how we can check the sum? We can use calculators and work like we did above. We can also check by working backwards and using the inverse operation. Our original number sentence and answer is 360x24 ÷180=48. Start with 48, our answer. We obtained this by dividing by 180. The inverse (opposite) of dividing is multiplying. Multiply: 180x48=8 640. We multiplied by 24 to get 8 640. The inverse of multiplying is dividing, so we must divide 8 640 by 24=360. This is the same as the first number in our number sentence, so our sum must be correct.

Problem Solving (15 minutes)

- Work with learners who are still not sure of multiplying and dividing. Alternatively, you can let learners who are good at their work and understand these concepts, work with the learners who are not sure. Sometimes learners understand their peers well. Give the learners three or four problems to solve. For each one, they must write a number sentence, do the calculations in the correct order and correctly, and write a full answer. They must also check their answers, using a calculator. Encourage them to check by doing the inverse operations. Examples of problems:
  - The flower grower picked 720 flowers and put them in bunches of 18 flowers. He did this for 15 days. How many bunches of flowers did he make?
  - 268 Chile soccer fans came to South Africa in 28 aeroplanes to watch the World Cup. They were then transported in buses which could carry 56 passengers. How many buses were needed?

Consolidation (15 minutes)

- Find sums in textbooks which entail using the correct order of operations for the learners to practise. You can include all the operations, as this is revision of the First and Second Terms' work. Examples:
  - 56+12x5 18x(3+2)+25 100-4x15+5

Grade 6: Week 2

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 5 **LO 2 AS 3** **LO 5 AS 1, 2, 3, 4**	**Milestones:** • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators. • Determine through discussion and comparison, the equivalence of different descriptions of the same relationship or rule represented verbally, in flow diagrams, in tables. • Pose simple questions about own school and family environment and identify appropriate data sources. • Uses simple data collection sheet (tallies0 and simple questionnaires (with yes or no responses) to collect data. • Distinguish between samples and populations. • Organise and record data using tallies and tables • Examine ungrouped data to determine mode and median. • Draw graphs and interpret data including pictographs with many-to-one correspondence and appropriate keys.

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

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Data Handling: Questionnaires.	Data Handling: Tally charts and pictographs.	Data handling: Median and mode	Equivalent fractions with 1- and 2-digit denominators	Number patterns: Represent rules verbally, in flow diagrams and tables
Resources	Chalkboard, textbooks, worksheets Prepared Assessment Task	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets

WEEK 2: Day 1

Notes to the teacher:

- Today's lesson and the next two will be devoted to data handling.
- It is important that learners understand that obtaining and analysing information helps predict future trends. For example, growth of urban population figures can help authorities to provide for infrastructure such as roads, water, electricity, and facilities such as schools (where the population consists largely of young families). If an area consists mostly of people older than 50, perhaps a home for senior citizens can be planned for. Other trends are analysed so that manufacturers can make and market products that will be bought by the consumer.
- Learners need to know the difference between a sample and a population. In the South African National Census, which takes place every 5 years, the entire South African population is required to a complete questionnaire to give information about the number of people in the house, the type of house, income, ages of family members and a lot more. It is not practical to do this kind of census more regularly, so sometimes a sample group is questioned, and that is taken as representative of the population in the area. For example, if you ascertain that most of the learners in your class have television sets, you can be fairly certain that most of the people in your area have television sets.
- In today's lesson, learners will devise and pose questions that require a yes or no answer. After that, they will think of appropriate questions about the school and family environment which require more than a yes or no answer.
- Because the learners will be walking around the class asking each other questions, there might be a bit of noise. Check that this does not get out of hand, and that all the learners are doing what they are meant to be doing.

Resources: Text books, chalkboard, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some counting activities. Count forwards and backwards in whole numbers. Either go around the class with each learners counting on from the previous learners, or ask individual learners to count until you say stop, or the learner makes a mistake, and then another learner continues. You can also let the learners count in groups. Examples:
  - Count forwards in 13s from 92
  - Count backwards in 11s from 431
  - Count in multiples of 12 from 84
  - Count in 101s from 101
  - Count backwards in multiples of 6 from 96

Concept Development (30 minutes)

- Tell the learners that the school principal wants to make some changes in the school. To do so, he must find out from the learners whether they would like these changes. All he wants is a simple yes or no answer to his questions. Let the learners, in their groups, brainstorm what kinds of changes could be made, and what questions they could ask that require a yes or no answer. The questions that your learners devise will depend on the school and its facilities. Encourage the learners to come up with realistic questions that require some thought to answer. Some questions they might come up with include:
  - Do you think our school should have a school uniform?
  - Do you think we should write exams every term?
  - Should we start and finish school an hour earlier each day?
  - Do you think it is a good idea to have school prefects?
  - After a couple of minutes, listen to the questions that the learners have made. Write the most sensible and interesting questions on the board. Allocate a question to each group.

- The group must devise a questionnaire to enable them to record answers. They might do this in the form of a tally chart, or with two columns with headings Yes and No. They do not need to write down any learners' names.

Should we wear school uniform?
Yes ~~////~~ ~~////~~ ///
No ////

Should we have school prefects?

Yes	No
✓✓	✓

- When each group has added up the numbers of Yes and No answers, let them give feedback to the class. Their questionnaires can be put on display in the classroom, along with further data recording sheets which will be completed over the next two lessons.

• Explain to the learners that every 5 years, there is a national census. This enables the government to obtain information about the people in the country (see Notes to the Teacher, above). Discuss the sort of questions the government might ask in the census, and why they need to know these things. Explain that the whole population – every single household in the country - has to fill in the questionnaire. Tell the learners that, in their groups, they are going to conduct a mini-census. They will ask their classmates certain questions relating to their homes. Explain that this information will be obtained from a sample of the population. Ask the learners what they understand by a sample. It means a small, representative group of people. This time, the questions asked must be put into at least five categories, not a yes or no answer like earlier. Give the learners a few minutes to discuss possible questions in their groups, and tell them that they must think about suitable questions for homework.

Assessment Task (20 minutes)

• Give the learners a few calculations and problems to assess work done so far this term. Calculations and problems should include:
  - Multiple operations (BODMAS);
  - Building up and breaking down of numbers;
  - Rounding off and compensating;
  - Properties of numbers

ASSESSMENT	**Informal:** Feedback from the learners about their questionnaires will enable you to ascertain that they are able to use simple questionnaires.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 8j: Estimate and calculate by using operations appropriate to solve problems that involve multiple operations of whole numbers with or without brackets. • LO 1 AS 10 c 10 d: Use a range of techniques to perform written and mental calculations with whole numbers including building up and breaking down of numbers, rounding off and compensating. • LO 1 AS 12b: Recognise, describe and use the commutative, associative and distributive properties of whole numbers.

WEEK 2: Day 2

Notes to the teacher:

- In today's lesson on Data Handling, learners must prepare a tally chart. They will complete the tally chart according to the responses from their class mates.
- After that they will draw a pictograph to represent the information. A pictograph has symbols to represent a certain number of e.g. learners. It must also have a key to show how many learners are represented by the symbol. A pictograph can be done vertically or horizontally.
- Mode of data will also be revised. The learners have learnt that mode means the most. As the learners need to also know the median of data, they sometimes get confused as to which word means what. It will help them by telling them that mode and most both start with the letters mo.

Resources: Chalkboard, paper for learners to work on.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- The learners can do some addition practice today. Write down rows of several numbers. Learners must identify pairs of numbers which are easy to add, then re-group the numbers and find a total. They must work individually in their workbooks. Give them about 10 sums. Example:
  - 25+82+48+52+75+18 = (25+75)+(48+52)+(82+18) = 100+100+100=300
- If there is time, do some Running Maths.

Concept Development (20 minutes)

- Learners were told in yesterday's lesson to think of suitable topics to question their classmates about. Ask learners in turn to tell you their ideas and the categories they thought of within the topic. (See Addendum for some ideas). Choose a suitable topic to work through, as an example, with the learners. Involve them by asking how to show each response. Each learner can even come up to the board and make his own tally mark. Doing tally charts is not new to the learners.
  - Topic: How far do we live from school:
  - Draw a tally chart with suitable categories. Ask each learner in the class to tell you how far from school they live, and then write a tally mark in the correct place. Total the tallies.

Distance	Tally	Total
Less than 1 km	~~////~~ ///	8
1-3 km	////	4
3-5 km	~~////~~ ~~////~~ //	12
5-10 km	~~////~~ ~~////~~ ~~////~~ /	16
More than 10 km		0

  - Draw a pictograph to show the above information. Tell the learners that you need to decide on a symbol to represent the number of learners. A "stick person" or drawing of a person (not too detailed) would be appropriate, 🚹 but any symbol is acceptable (e.g. ♉ ☐ ★).

- We want this symbol to represent a number of learners, and this needs to be shown in a key. In this case, 🧍 can equal 4 learners. Our graph also needs a heading.
- By questioning the learners and having them participate, draw the following pictograph on the board:

  <u>Pictograph showing the distance learners live from school</u>

Distance	No. of learners
Less than 1 km	🧍 🧍
1-3 km	🧍
3-5 km	🧍 🧍 🧍
5-10 km	🧍 🧍 🧍 🧍
More than 10 km	

KEY:
🧍 = 4 learners

- Sometimes it is necessary to draw a fraction of a symbol. In this example, two learners would equal half of the symbol. One learner would be represented by a quarter of the symbol.
- As the learners what the mode of the above data is. In other words, how far from school do most of the learners live? The mode of this data is 5-10 km.

Investigation (15 minutes)

- Give each learner a piece of paper and one extra for the group. Give each group of learners a suitable topic. Each group can have a different topic. They must draw a tally chart, and then they can go round the class, one group (or one member from each group) at a time, and ask all the learners to respond to the question that they ask, filling in the tally chart. The learners who are not busy asking questions can be busy preparing their own tally chart and pictograph, so that when they have the information, they can fill it in.

Consolidation (15 minutes)

- Each learner can re-do the tally chart neatly on a piece of paper. After that, each learner must draw a pictograph to display the information on the tally chart. Encourage the learners to work neatly. They can colour in their symbols if they wish to. They must also write down the mode of the data. Put one tally chart and one pictograph from each group on display in the classroom.

ASSESSMENT	**Informal :** Walk around the class and check that the learners are able to do a tally chart and pictograph.

WEEK 2: Day 3

Notes to the teacher:

- Yesterday, the learners revised mode of data. This will be revised today, but the learners must be able to find the mode of ungrouped data.
- The lesson also focuses on finding the median of ungrouped data. Median is the middle number. ("Med" sounds a bit like "mid".) To find the median, the numerical data must first be arranged from the smallest to the largest number. The middle number in this range is the median.
- If there are two numbers in the middle, we take the number between those two numbers as the median. For example, our range of numbers is 2, 3, 4, 6, 7, 7. 4 and 5 are the middle numbers. What number comes half way between 4 and 6? 5. 5 is the median. If the two numbers in the middle are the same, that number is the median. Example: our range is 2, 4, 4, 8. 4 is the median Do not explain this to the learners, but if a learner asks, then you can tell him or her. At this stage, make sure you use ranges of data which have only one middle number.

Resources: Chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Practise multiplication tables. Do a round of Tables King (see Addendum for instructions) then Times Table Clock (see Addendum).

Concept Development (20 minutes)

- Tell the learners that we are going to do another kind of survey. The librarian was asked by the Education Department to find out how many books each learner reads in a term. As the learners walked into the library, she asked them how many books they read. Unfortunately, she does not know about tally charts, so wrote the learners' responses like this:

2	1	5	4	8
3	4	1	0	4
6	5	7	1	3
2	4	5	4	0
5	3	2	4	6

- The librarian was asked to find the median and the mode of the data but she does not know how to do this either, so we must help her. She looked in her dictionary, and found that median means in the middle.
- Ask the learners how they think we can find the median. It is not the 7, which is the number in the middle of the data as it is written down. We first have to re-write the numbers, from smallest to largest. A learner can come and write the numbers in ascending order on the board. Another learner can cross out the numbers as they are re-written. Our range will now look like this:

  0 0 1 1 1 2 2 2 3 3 3 4 4 4 4 4 4 5 5 5 5 6 6 7 8
- How many numbers are in our range? There are 25. So which is the middle number? It is the thirteenth number (12 numbers on each side of it)

  0 0 1 1 1 2 2 2 3 3 3 4 / <u>4</u> / 4 4 4 4 5 5 5 5 6 6 7 8.
- The median of this data is 4.

- Ask the learners what the mode of the data is? It is also 4, because 4 is the number which appears most.

- Do another example with the learners. You need only write a range of numbers with 5, 7 or 9 numbers in it, so that they can understand the concept of median.

Consolidation (30 minutes)

- Ask the learners their shoe sizes. Ask them in turn around the class, and write the sizes down in random order. If there is an even number of learners in the class, write your shoe size down as well to ensure there is an odd number of numbers in the data range. Learners must work on their own in their workbooks to:
  - Find the median of the data
  - Find the mode of the data
  - Organise the data into a tally chart
  - Draw a pictograph to show the data.
- Write down 21 "Marks out of 15" obtained by learners, (11; 13; 11; 14; 9; 8; 8; 7; 10; 6; 8;…. etc) The learners must find the median and mode of this data.

ASSESSMENT	**Informal:** Check the learners' class work to see if they understand median, mode and how to draw a tally chart and pictograph.

WEEK 2: Day 4

Notes to the teacher:

- In today's lesson we will re-visit equivalent fractions. This concept was taught in Term 2, Week 2, Day 4, where the fractions had a single-digit denominator. Today,
- The concept is identical no matter how many digits the denominator is made up of. To make an equivalent fraction, the rule is that whatever one does to the denominator, one does the same to the numerator.
- In this lesson, we will also revise addition of common fractions and converting from improper fractions to mixed numbers and vice versa. These two concepts are closely linked to equivalent fractions.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" using all the operations, plus doubling and halving (See Addendum for instructions).
- Give the learners ten calculations to complete individually in their workbooks. You can write the sums on the board. Examples:
  - 285+□=1 000
  - Which two numbers add up to 550: 275; 231; 265; 199; 219
  - Which number comes next in this sequence: 581; 572; 563; 554; 545; ….
  - What number is 10 000 more than 35 467?
  - $\frac{5}{6}$ of 36 learners like swimming. How many do not like swimming?
  - Write down the largest 7-digit number using different digits.
  - There are 1 200 ants in the nest. How many legs are there?
  - Write down the product of 12 and 11.
  - What is the difference between 1 001 and 555?
  - I have 2 R10 notes and 5 R5 coins in my wallet. How much money do I have in my wallet?

Concept Development (20 minutes)

- Pose the following problem to the learners to discuss and try to solve in their groups: *Three friends went to have pizza. Martha ate $\frac{3}{4}$ of a pizza, Isabel ate $\frac{7}{12}$ of a pizza, and Beauty ate $\frac{2}{3}$ of a pizza. Arrange the amounts of pizza they ate in ascending order. How much did the person who ate the most pizza and the person who ate the least pizza eat altogether?*
  - Walk around the class to see how the learners are tackling this problem. Give them a clue: "Equivalent fractions". After a few minutes, discuss the method with the learners.
  - Look for a number that all three denominators can divide into. In this case they can all go into 12.
  - Change each fraction into equivalent fractions with denominators of 12:

$$\frac{3}{4} = \frac{?}{12} = \frac{3x3}{4x3} = \frac{9}{12}$$

$\frac{7}{12}$ $= \frac{7}{12}$

$\frac{2}{3} = \frac{?}{12} = \frac{2x4}{3x4} = \frac{8}{12}$

To compare fractions, all the fractions must have the same denominator. Whatever you do to change the denominator of a fraction, must be done to the numerator.

- The fractions in ascending order = $\frac{7}{12}$ eaten by Isabel; $\frac{2}{3}$ eaten by Beauty; $\frac{3}{4}$ eaten by Martha.
- To add what Isabel and what Martha ate, we can use the fractions we created with denominators 12. $\frac{9}{12}+\frac{7}{12}=\frac{16}{12}$.
- Ask the learners what a fraction is called with a numerator larger than the denominator? It is an Improper Fraction.
- Ask the learners whether we can leave our answer as an improper fraction? No, we must change it into a Mixed Number. To do that, we divide the numerator by the denominator: 16÷12=1 remainder 4. We write the remainder as the numerator over denominator 12.

  So our answer is now $1\frac{4}{12}$.
- Ask the learners if there is anything more we can do to this answer? Remind them about writing fractions in their simplest form. Is there a number which we can divide into the numerator 4 and the denominator 12? Yes, they can both be divided by 4. $1\frac{4}{12}=1\frac{1}{3}$ pizza was eaten altogether by these two people.

• Divide your chalkboard into six columns to give six learners their own working space. Ask six learners to come to the board, see who can work out first with fraction is bigger: $\frac{5}{8}$ or $\frac{17}{24}$. After a few minutes, let the learners stand aside and ask the class which learners arrived at the correct answer. Check that the first fraction was changed into denominator 24 to make $\frac{15}{24}$. Therefore the second fraction is larger.

- Repeat the above with two, three or four more groups of learners, each time going through the method and ensuring that all learners know how to make equivalent fractions and compare fractions with different denominators. Make sure that you use fractions with single-digit and 2-digit denominators.

Consolidation (30 minutes)

• Learners who understand this work can work on their own to complete written tasks from their textbooks. You can work with groups of learners who do not seem to fully understand this work. If there are no suitable exercises in the textbook, write sums on the board such as the following. Give the learners several of each kind:

- Write down equivalent fractions: $\frac{5}{7}=\frac{10}{?}$.; $\frac{7}{12}=\frac{?}{36}$
- Change the following fractions to fractions with denominator 24 then arrange in descending order: $\frac{3}{8}$; $\frac{7}{12}$; $\frac{5}{6}$; $\frac{2}{3}$

Write four equivalent fractions for: (a) $\frac{3}{8}$ (b) $\frac{2}{5}$ (c) $\frac{7}{10}$ - Give pairs of fractions with different denominators. After converting the fractions to fractions with the same denominator, learners must fill in the correct relationship sign. (=; <; or >) - Write the following fractions in their simplest form: $\frac{5}{10}$; $\frac{4}{20}$ (do a few)	
ASSESSMENT	**Informal:** You will be able to assess your learners' ability in this concept from how they calculated equivalent fractions in their groups, on the chalkboard and in their workbooks.

WEEK 2 : Day 5

Notes to the teacher:

- The focus of today's lesson is on number patterns.
- Learners must be able to describe different number patterns verbally, in flow diagrams, by number sentences and in tables.
- Extending, describing and representing number patterns in tables and flow charts were done in Term 2, Week 4, Day 2 and 3. This is not a new concept for the learners. However, number patterns take a great deal of practice.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners magic squares to complete. Each row, column and diagonal has the same total. The learners find this total by adding up the numbers in the one full row, column or diagonal. They can work in groups, pairs or individually to solve the following number squares:

1			4
12	6	7	9
	10	11	
		2	

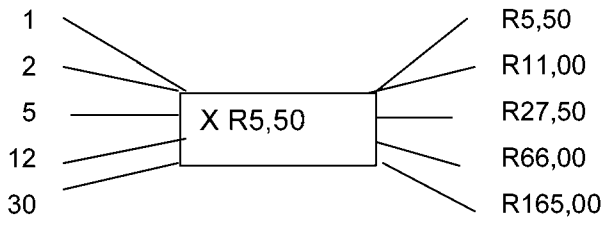
8		21	
19			16
15	17	18	
20		9	23

Concept Development (20 minutes)

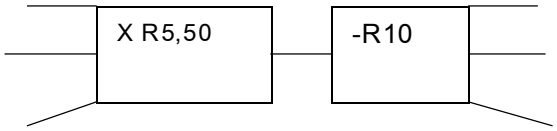
- Tell the learners that a 500 g tin of powdered milk costs R5,50. The local crèche owner buys a lot of milk, but she does not have a calculator and cannot do Maths, so needs to know how much money to take to the store when she buys tins of milk. She usually buys 1 tin, 2 tins, 5, 12, or 30 tins at a time. You have offered to help her by writing what these different quantities would cost her in table form. Tell the learners to do this as quickly as possible in their groups. Afterwards, let a learner come and write the table they have devised on the board:

No. of tins (χ)	1	2	5	12	30
Cost in R (y)	5, 50	11,00	27,50	66,00	165,00

- Ask the learners if they can tell you the rule. χ x R5,50 = y. Revise this from Term 2, Week 4.
- How can we represent the same information in a flow chart? Let one or two learners come to the board and draw a flow chart:



- Tell the learners that the shop gives the crèche owner R10 discount (money off) if she buys 15 or more tins of powdered milk at a time. What is the rule now? χ xR5,50-R10=y.
- Ask two or three learners to come up to the board (give each learner their own working space) to draw a flow chart to represent this rule:



- Now work from a table and let the learners think of a possible problem to write based on the rule of the table. For example:

χ	2	3	8	10	11	b	42
y	6	9	24	30	a	99	c

Possible problem: In a group of people, there are three times as many men as women. How many men are there if there are 11 women? How many women are there if there are 99 men?

Problem solving (30 minutes)

- Give the learners problems to solve by using a table and a flow chart. Each time they must write down the rule. Examples:
  - It takes 5 men 3 hours to tile the classroom. Calculate by completing a table, how many hours they will take to tile 5 classrooms, 8 classrooms, 15 classrooms and 22 classrooms. Write down the rule (number sentence) for this problem. If they worked for 72 hours, how many classrooms did they tile?
  - It costs R1 234 for 1 000 tiles. Show, by means of a flow diagram, how much it will cost for 500 tiles, 1 500 tiles, 8 000 tiles and 13 500 tiles. (Calculators can be used). Write down the number sentence for this problem.
  - The plumber charges R50 to visit my house and R75 per hour for his labour. How much will I have to pay if he works for 1 hour, 3 hours, 4 hours and 6 hours. Show this by means of a flow chart.
  - In groups, learners can write interesting story sums (problems) to describe number patterns presented in tables. Give each group of learners a different table. They can write a suitable problem. Hand out the different problems to different groups who must write down the rule (number sentence), draw a table and flow chart, and solve the problems. For example, Group A has the following table:

χ	1	2	4	16	24
y	6	12	24	96	144

- Group A writes the following problem: The farmer packs 6 eggs in a box. How many eggs can he pack in 2, 4, 16 and 24 boxes?
- Collect in all the problems. Give Group A's problem to Group B. Give Group B's problem to Group C. Each group of learners must write down the rule and draw up a table and flow chart to solve the problem they have.
- Afterwards, each group can give their solutions back to the group which set the problem. The group which set the problem can mark it.

Grade 6: Week 3

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 1, 5, 6, 8 **LO 2 AS 1**	**Milestones:** • Count forwards and backwards in decimals. • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators • Recognise and use equivalent forms of decimal fractions to at least 2 decimal places • Solve problems in contexts such as financial (reading and interpreting accounts and discount) • Estimate and calculate by selecting and using operations appropriate to solve problems that involve addition and subtractions of positive decimals with at least 2 decimal places. • Investigate and extend numeric and geometric patterns looking for a general rule or relationships.

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:	Number patterns extending and describing	Equivalent forms of common fractions and decimal fractions to 2 decimal places	Decimal fractions – place value to 2 decimal places	Addition and subtraction of decimal fractions to 2 decimal places	Financial: reading and interpreting accounts and discount
Resources	Chalkboard, textbooks, worksheets. Prepared Assessment Task	Chalkboard, textbooks, worksheets. Decimal fraction squares (see Addendum)	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.	Chalkboard, different accounts (doctor, telephone, shop), blank invoice (see Addendum)

WEEK 3: Day 1

Notes to the teacher:

- In today's lesson we will again focus on number patterns.
- Learners will again extend patterns, describe them in their own words, and write a rule for the pattern. The rule can be represented in a flow chart and/or table.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

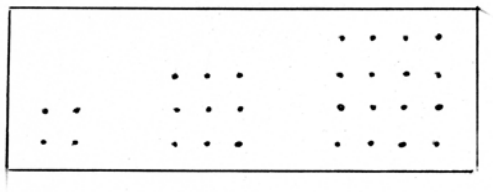
- Do some Running Maths (See Addendum). Use different operations, doubling and halving.
- Give the learners 10 – 15 multiplication tables sums to complete in their workbooks. Include some x0. Afterwards, the learners can swop books and mark each other's work. Check to see who got full marks, one wrong, two wrong, more than two wrong.

Concept Development (15 minutes)

- Draw the following pattern on the board: ⇐ ⇑ ⇒
  - Ask two or three learners, in turn, to come and draw the next pictures in the pattern. Ask the learners in the class who can describe the pattern in their own words. They must be able to say that the arrow is being rotated in a clockwise direction. If they can also tell you it is being rotated by 90°, it is good.
  - Repeat with another few patterns, each time asking different learners to come and extend the pattern. Examples you can use:

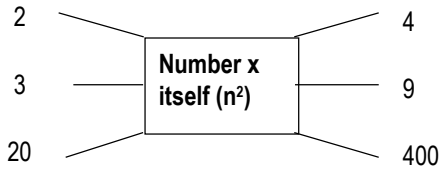
    ◊ ○ ○ ◊

    △ ▽ □ △ △ ▽ ▽ □
  - Now draw a pattern such as the following on the board:



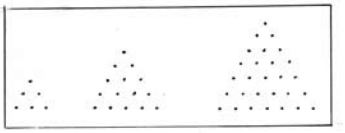
  - Ask a learner to come and draw the next pattern on the board. Ask another learner to come and draw the pattern after that on the board.
  - Ask the learners to try, in their groups, to establish a rule. Tell them that If we wanted to work out how many dots there would be in a square with 20 dots in the bottom row, without drawing the dots, how could we work out it out? Listen to their answers, and, if nobody managed to work it out, tell them that we have taken the number of dots in the bottom row and multiplied that number by itself to find out how many dots. So, if there are 20 dots in the bottom row, there would be 20x20 dots in the pattern, which equals 400 dots.

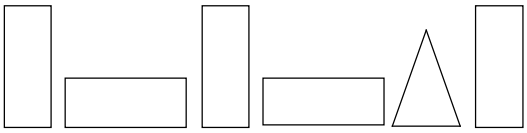
- How would we show this rule in a flow chart?



Consolidation (15 minutes)

- Give the learners geometric patterns to extend and describe in their own words. They must try to establish a rule for each pattern. Examples:





- Let the learners draw two or three of their own geometric patterns. They can swop with a partner, and the partner can describe the pattern.

Assessment Task (20 minutes)

- Give the learners ungrouped data. They must find the median and mode of the data. For example:
  - Below are the ages of the competitors at the Paralympics:

56 21 28 54 30 28 21 18 24 32 24 33 24 35 28 24 30 42 24 27 36 35 41 18 20 33 24

  - Determine the median and the mode of this data.

ASSESSMENT	**Informal:** Observe from the learners' verbal responses and from their class work whether they can describe and extend number patterns.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 5 AS 5. Examine ungrouped numerical data to determine mode and median.

WEEK 3 : Day 2

Notes to the teacher:

- Learners are familiar with decimal fractions to one decimal place as this was taught in the first term.
- The focus of today's lesson is to recognise decimal fractions to two decimal places and their equivalence to common fractions.
- Learners are exposed to decimal fractions to two decimal places in their dealings with money.
- The decimal comma separates the whole numbers to the left of the comma from the decimal fractions to the right of the comma. The calculator shows the decimal point as a point (dot/full stop). We read a number such as 78,23 "Seventy eight comma two three". Do NOT let the learners say "Seventy eight comma twenty three."
- The first digit after the decimal comma is tenths (abbreviated t) and the second digit after the comma is hundredths (h). Emphasise hundred**th**s, as many learners get confused with Hundreds.
- Decimal fractions are the calculator's way of writing a fraction.
- Learners need to know how to add and subtract decimal fractions with two decimal places for Assessment Task 1. To make this more meaningful, they need to understand the concept of decimal fractions to two decimal places and the place value of the digits after the decimal comma.

Resources: Chalkboard, squares divided into tenths and hundredths (see Addendum), worksheets, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners some addition, subtraction, multiplication and mixed operation sums to do individually in their workbooks. Give them 20 sums such as:
  - 8x☐=64 7+9x3=☐ 55+63+45+20+37=☐ 27x5=5x☐
  - 215+18x0=☐ 12x12+100=☐ 1 000-564=☐ 155-100+38=☐

Concept Development (25 minutes)

- Draw a square or rectangle, divided into tenths, on the board. (See Addendum Tenths and Hundredths squares for how to draw it). Ask the learners into how many equal parts the square has been divided. Ten. What do we call each part? A tenth ($\frac{1}{10}$)
  - Ask a learner to come to the board and shade in a tenth. Ask them if they remember the calculator's way of writing $\frac{1}{10}$. 0,1. How do we say that number? Nought comma one. What is the place value of the zero in 0,1? Units. What is the place value of the 1? Tenths.
  - Ask another learner to come and shade in more parts of the square to make 3 tenths shaded. Repeat the questions that you asked about 1 tenth.
  - Repeat with half (0,5) and $\frac{4}{5}$ (0,8).
- Using your board ruler, draw a decimal square divided into hundredths on the board 9an example is in the Addendum: tenths and hundredths squares):
  - Ask the learners if they can tell you into how many smaller squares the square has been divided. 100. How do we write this as a common fraction? $\frac{1}{100}$. Can anyone think how the calculator would write this? A clue is to think about money, how we would write one cent in decimal notation? Let the learners give you their ideas. Ask them to use their

- calculators: $\frac{1}{100}$ means 1÷100. If they punch that into their calculators, they will find out that $\frac{1}{100}$ is written as 0,01. How do we say that? We say "Nought comma nought one".
- Going back to money and referring to the decimal block, ask the learners if they can tell you what the place value of the 1 in 0,01 is? It is hundredths.
- Shade in 3 squares. Ask the learners to say what fraction has been shaded in? $\frac{3}{100}$. How do we say this and write it as a decimal fraction? Nought comma nought three, write it 0,03.
- Repeat the above a few times by shading in more squares to make e.g. 8 squares shaded, 27 squares shaded, 42 squares shaded, etc. Ask questions about each fraction you have shaded.
- On the board, write a till slip such as the following. You can adapt items and prices to suit your learners, but use the following as a basis for some questions (examples below), which individual learners can answer, to practise recognising place value of tenths and hundredths. Explain that although the numbers are prices in Rands and cents, you will practise reading them as decimal numbers.

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ONIONS MED CL2	1PK	VIT	6,17
WHITE SLICED BREAD			7,99
CHARKA BRIQUETTES 5KG			34,99
LADISMITH CHED 1 GRADE			14,97
CHOPSTICK RICE	500GR	VIT	5,99

- Read the number next to the onions. What is the place value of the 6? (Units or ones) Which digit is hundredths? (7). Read the number. "Six comma one seven". How would we write this number in expanded notation? $(6x1) + (1x\frac{1}{10}) + (7x\frac{1}{100})$
- How many tenths in the number next to the tomatoes (0). How would we write the price of the tomatoes as a common fraction? $9\frac{8}{100}$. Can we simplify this fraction (write it in its simplest form? Yes, $9\frac{2}{25}$
- How many tenths in the number next to the carrots? 4. If we have $\frac{4}{10}$, how many hundredths is this the same as? $\frac{4}{10}=\frac{4x10}{10x10}=\frac{40}{100}$. In the hundredths place, there is a 9, how many hundredths altogether? $\frac{40}{100}+\frac{9}{100}=\frac{49}{100}$.

- In groups, give the learners a table such as the following but with more examples to complete. They can use their calculators. Remind them that they can divide the numerator

- by the denominator to find a decimal fraction. After they have had enough time, go through and discuss the answers with them. The first row is completed for you.

Common fraction in simplest form	Common fraction $\frac{?}{100}$	Decimal fraction
$\frac{1}{2}$	$\frac{50}{100}$	0.5
		0.25
$\frac{3}{5}$		
	$\frac{8}{100}$	
		0.75

Consolidation (25 minutes)

- Earlier in the lesson you gave the learners squares comprising hundredths. Now also give them a page of squares divided into tenths. They must shade in different fractions on different squares and give an equivalent form. For example:
  - Shade in 5 hundredths. Paste the square into your book and write this as a common fraction in its simplest form
  - Shade in 2 tenths. Shade in the equivalent amount in hundredths. Paste the two squares side by side in your workbook. Write this as a decimal number.
  - Shade in 1 whole and 7 hundredths. Paste the two squares side by side in your workbook. Write down the decimal fraction you have shaded.
  - One your tenths block, shade in the equivalent of 10 hundredths. Write this as a common fraction and a decimal fraction.
- Each learner must complete their own copy of the table that they just completed in groups. Take in the one they completed in groups, give each learner a new one to fill in.
- Find any similar examples in textbooks for the learners to complete. Textbooks usually have shaded squares from which learners must write down the fraction that is shaded. If you cannot find suitable examples, make a worksheet.

ASSESSMENT	**Informal:** Assess from the learners' verbal responses and written work how well they understand the concept of hundredths.

WEEK 3: Day 3

Notes to the teacher:

- Today's lesson continues from yesterday's lesson on decimals to two decimal places. Today, the focus will be on place value and comparing decimal fractions (bigger than, smaller than, and equal to).
- Learners need to know how to add and subtract decimal fractions with two decimal places for Assessment Task 1. To make this more meaningful, they need to understand the concept of decimal fractions to two decimal places and the place value of the digits after the decimal comma. Place value will only be assessed later in the term.

Resources: Chalkboard, worksheets, textbooks.

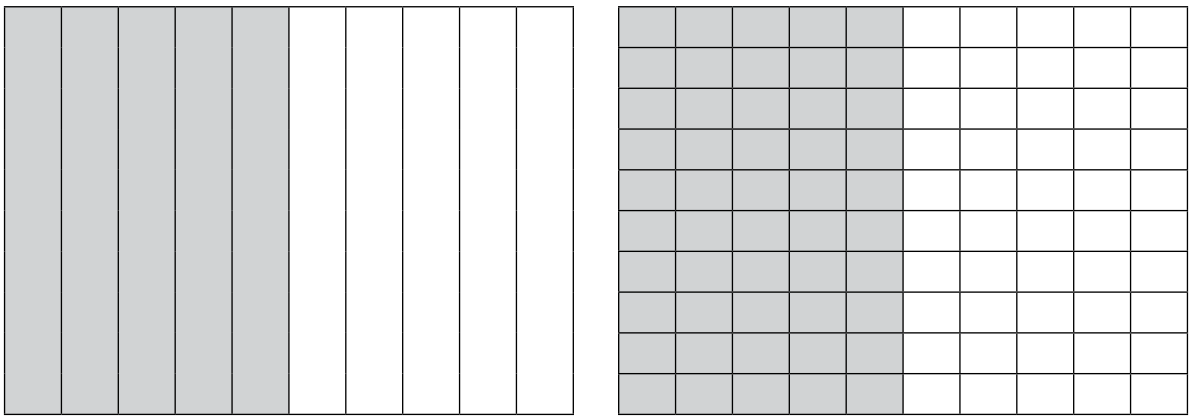
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count forwards and backwards in decimals. Go around the class, learner by learner, where each learner says the next number. Otherwise, let one learner count for a while, then another learner continues. Another way is for one learner or a group of learners count according to your instructions. Vary what you do to keep the learners interested. Examples:
  - Count forwards in tenths from 5,1 to 9,2
  - Count backwards in hundredths from 5,05 to 4,76
  - Count forwards (say the first four numbers so that learners see the pattern): 2,25, 2.5, 2.75, 3, ……. (until you tell the learners to stop)
  - Count forwards (say the first four numbers so that learners see the pattern): 5.2, 5,4, 5,6, 5,8 ……..
  - Count backwards: (say the first four numbers so that learners see the pattern):13,5, 13, 12,5 12 ……

Concept Development (25 minutes)

- Draw sketches on the board (use the board ruler) and shade in half of each like below. Ask the learners questions to introduce comparing decimal fractions.



  - Which square has the greatest part shaded? They are both the same. The shaded part of the square on the left = $\frac{5}{10}$ or 0,5. (revise the concept of tenths). The shaded fraction of

the square on the right = $\frac{50}{100}$ or 0,50. (Revise hundredths). Therefore, 0,5=0,50. Ask the learners whether the zero after the 5 changes the value of the second fraction. It does not.

- Write 10 or more pairs of decimal fractions on the board. Ask the learners in their groups to fill in the correct relationship sign to replace the *. Examples:
- 0.8*0.7 0,78*0,81 0,6*0,60 0,16*0,61 0,55*0,5 0,07*0,70 0,2*0,12 0,35*0,5
- Let different learners come and write the answers on the board.
- In most cases, the learners should not have had a problem in deciding which decimal fraction was the larger. However, if they had difficulty, tell them to think of cents in a Rand when comparing two 2-digit decimal numbers. For example, the second one above. Which is greater, 78 cents or 81 cents? 81 cents is, so 0,78 $\langle$ 0,81.

Relationship signs: $\langle$; $\rangle$ and =. Learners often confuse the first 2. Tell them that the open mouth of the "crocodile" always faces the bigger number, as he wants to eat the bigger number.
9 $\rangle$ 8 or 8 $\langle$ 9.

- Learners also have difficulty comparing a decimal fraction with one digit after the comma with a fraction to 2 decimal fractions. They can fill up the 1-digit decimal with 0s *at the* end to make it a 2-digit decimal. The 0s at the end do not change the value of the decimal, as discussed earlier. For example: Which is larger, 0,2 or 0,12? Tag a 0 on the end of the 1-digit decimal = 0,20. One can either think in terms of money, or temporarily forget about the *0,* part of the decimal and ask yourself which is bigger, 20 or 12? 20 is bigger, so 0,2 $\rangle$ 0,12.
- Do some more examples with the learners to make sure that they grasp this.

- In yesterday's lesson, expanded notation of decimal fractions was touched on. Deal with this in greater depth now. Write a number on the board such as 18 569,57. Ask the learners how we write this in expanded notation. Let different learners come up in turn to complete each part:

  - 18 569,57 = $(1x10\ 000)^{1st\ learner}+(8x1\ 000)^{2nd\ learner}+(5x100)+(6x10)+(9x1)+(5x\frac{1}{10})+(7x\frac{1}{100})$
  - Do a few more examples, making sure the learners participate. You can also divide your board into 4 or 5 equal sections, and let 4 or 5 different learners use that space to have a race to see who can write a given number correctly in expanded notation first.
  - Give a few examples where the number is expanded and the learners have to write the number. For example, what number is equal to $(5x100)+(3x1\ 000)+(1x1)+(5x\frac{1}{100})$. The number is 3 501,01. Do not use all the place values every time, and write the expanded number in random order.

Consolidation (25 minutes)

- If you cannot find appropriate work in the textbook, make a worksheet or write work on the board for the learners to complete, individually, in their workbooks. They should do a few examples of each of the following:
  - Arrange in ascending order: 0,21; 1,2; 0,12; $\frac{2}{10}$; 1,12

- Arrange in descending order: 0,05; 0,5; 0,51; 0,15; $\frac{52}{100}$ - Replace the * with the correct relationship sign: $\frac{1}{4}$ *0,24 - Write the following number in expanded notation: 5 123,89 - Write down number which equals (5x$\frac{1}{10}$)+(4x100)+(8x$\frac{1}{100}$)+(6x1)+(9x1 000) - Write down the place value of the 3 in each of the following: 52 369; 1 235 689; 158,03; 235,38; 3 568 139 - Write down the number which is 5 tenths more than 12.23 - Write down the number that is 4 hundredths less than 4 569,37	
ASSESSMENT	**Informal:** Mark the learners' class work to check that the learners understand the concept of today's lesson.

WEEK 3: Day 4

Notes to the teacher:

- In today's lesson, the focus is on addition and subtraction of decimal fractions to 2 decimal places.
- By now, the learners should be competent in adding and subtracting in columns. This is by far the most efficient method of doing these operations.
- When adding and subtracting decimal fractions in columns, the most important thing is to line the decimal commas and digits with the same place value under each other. This is particularly important when the numbers being added have different numbers of digits before and after the decimal comma.
- Start adding or subtracting with the digit furthest to the right (smallest place value), i.e. the hundredths.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Play "Zap" on calculators. See Addendum – Mental strategies, for instructions. Numbers must include decimal fractions to 2 decimal places.

Concept Development (20 minutes)

- Give the learners a problem such as: *The electrician needed 17,34 metres of cable for his job at one house, and 12,87 metres of cable for his job at another house. How much cable did he need altogether?* Ask the learners to put up their hands if they think they know how to solve this problem. Choose 5 or 6 of these learners; divide your chalkboard into 5 or 6 columns to make a working space for each of them to do the sum.
  - When the learners have finished, check that they all got the sum correct. Other learners can also look. See if they all used the column method. If they did not, see that they still obtained the correct answer and that their method was not too slow.
  - Go through the key points with the learners: Line the digits and decimal commas up correctly, start with the hundredths and work to the left.

$$\begin{array}{rrcrr} {}^{1}1 & {}^{1}7 & , & {}^{1}3 & 4 \\ +\,1 & 2 & , & 8 & 7 \\ \hline 3 & 0 & , & 2 & 1\text{m} \\ \hline \end{array}$$

  - Now change the problem slightly. Tell the learners that the electrician re-measured and found that he actually needed 17,3 metres of cable for the first house. How much cable did he need? Give another group of learners a turn to work this out on the board.
  - Afterwards, check their work.

$$\begin{array}{rrcrr} {}^{1}1 & {}^{1}7 & , & {}^{1}3 & \mathbf{0} \\ +\,1 & 2 & , & 8 & 7 \\ \hline 3 & 0 & , & 1 & 7\text{m} \\ \hline \end{array}$$

Ensure that the decimal commas and digits with the same place value are lined up under each other. Write in a zero to help keep the digits in line. A zero at the end of the decimal fraction does not change the value of the number.

  - Give another group of learners a similar problem, where they need to fill up with a zero, to do on the board.

- Change the first problem into a subtraction problem: *The electrician needed 17,34 metres of cable for his job at one house, and 12,87 metres of cable for his job at another house. What is the difference between the lengths of cable he needed?* Let another group of learners do this sum on the board:

$$\begin{array}{rrcrr} 1 & {}^{6}7 & , & {}^{12}3 & {}^{1}4 \\ -1 & 2 & , & 8 & 7 \\ \hline & 4 & , & 4 & 7\text{m} \\ \hline \end{array}$$

Subtraction is not commutative.
Learners often fall into the trap of taking the smaller digit from the larger digit, in this case, saying 7-4. Be on the look out for this.

- Go through the subtraction process step by step by asking questions to ensure that the learners are participating.
- Ask the learners how we can check the answer? Add 4,47 and 12,87 = 17,34. Our answer is therefore correct.
- Give another group of learners a problem to do where they need to fill up with a zero in the hundredths place.

Consolidation (15 minutes)

- Find exercises in the textbook to practice addition and subtraction of decimal fractions. If there are no suitable exercise, write your own on the board or make a worksheet. Learners must work on their own to complete the work. Work with a small group of learners who are struggling with this concept. Make sure that the work you give the learners has addition and subtraction in random order and that there are examples where the learners have to fill the hundredths place with a 0.

Problem Solving (15 minutes)

- Give the learners 4 to 6 problems, which entail adding and subtraction of decimal fractions, to solve. Problems could be based on money or length (metres).

ASSESSMENT	**Informal:** Letting different learners work on the chalkboard will enable you to see who does not understand this work. You can also check their written work to see who has not grasped this concept.

WEEK 3: Day 5

Notes to the teacher:

- Today the learners will learn to read and interpret accounts and understand what a discount is.
- A discount is an amount of money that is taken off the total amount payable. It is often given by doctors for prompt settlement of an account. Sometimes, if a person pays for something with cash, (not with a credit card or on account) they are given a cash discount.
- Discount is usually a percent of the total. The learners at this stage have not learnt about percentage, so do not expect them to be able to find a percentage of an amount.

Resources: Copies of different accounts: telephone, doctor, clothing store, credit card, and municipal (any that you can get hold of). Blank Invoice (see Addendum). The Addendum also contains an invoice which shows what needs to be filled in, for your information.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 10 to 15 problems to solve in their heads. Say the problems and each learner must write down the answers only. Use all the operations. Examples:
  - I had 12 dozen eggs. I used 19 of them to make scrambled eggs for a party. How many eggs were left?
  - Twelve football teams were standing on the field for the World Cup opening ceremony. How many football boots were there?
  - I watched TV for 1 hour 35 minutes. How many minutes was this?
  - Peter went fishing on Saturday and didn't catch any fish. On Sunday, he caught 15 times as many as on Saturday. How many fish did he catch on Sunday?

Concept Development (25 minutes)

- Give each group of learners a copy of an account. If possible, have as many different accounts as possible. Ask the learners if they know what an account means. When we owe someone money for goods bought or for services, we receive an account from them. The account gives us a certain amount of information. The learners will now study the account they have to find what information is given by writing down the answers to the following questions (you may be able to think of many more). You can write the questions on the board if you are unable to photocopy them for each group:
  - Who sent the account? (Municipality, doctor, clothing store etc)
  - What is the account for?
  - What is the recipient's account number or reference number?
  - What is the date on the account?
  - What is the amount that must be paid on the account?
  - What is the amount that must be paid called on the account? (Amount payable/Total due)
  - By when must this account be paid? What is this date called on the account? (Due date/ Payable by)
  - How much is the VAT portion on the account?
  - Is there any discount offered?
  - What options are there for payment, e.g. by cheque, cash, direct transfer?

- When all the groups have finished answering the questions, go through each question and listen to each group's answer to that question. Discuss the vocabulary. Explain what a discount is. Discuss the pros and cons about having an account, especially at a clothing or furniture store. If the learners have any additional information on their account that has not been discussed, give them the opportunity to ask about it. For example, most accounts have a VAT registration number. The whole concept of VAT can be discussed.

Consolidation (25 minutes)

- Hand out copies of the blank Invoice (see Addendum – you can adapt this to suit yourself). Each learner must fill in the blank spaces as if they are the person sending the account. Explain to them what they need to fill in:
  - Their business must have a name
  - They must design a company logo which is appropriate to their kind of business;
  - Their business needs an address, telephone number, fax number, e-mail address;
  - They must fill in the person's details to whom they are sending the account.
  - They must fill in what the person has purchased and any discount given.
  - They can add up the right hand column to find the sub-total (no calculators for this, it is good practice)
  - They can calculate the VAT amount on their calculators – enter R amount x14% - and fill this in, then find the total due.
  - After completing their invoice, they can swop with a friend who will check that the account makes sense and is correct.

ASSESSMENT	**Informal:** Check from the learners' participation in the group work and their answers to the questions whether they could read and interpret an account. If the learners filled in the invoice correctly, they have grasped this concept.

Grade 6: Week 4

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 5, 10 **LO 2 AS 4** **LO 4 AS 5**	**Milestones:** • Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators • Recognise and use equivalent forms of decimal fractions to at least 2 decimal places. • Use a range of techniques to perform written and mental calculations with whole numbers included using a calculator. • Write number sentences to describe a problem situation within a context • Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement)

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: Problem solving	Calculator skills: Memory key. Write number sentences	Revise Measurement: Length	Revise Measurement: Mass and Capacity	Revision: common fractions and decimal fractions.	Problem solving using SI units.
Resources	Chalkboard, textbook, worksheets. Calculators	Chalkboard, textbook, worksheets	Chalkboard, textbook, worksheets Prepared Assessment Task: Mental calculations involving multiplication to at least 12x12	Chalkboard, textbook, worksheets. Prepared Assessment Task: Mental calculations involving addition and subtraction Prepared Assessment Task – tallies and pictographs.	Chalkboard, textbook, worksheets. Prepared Assessment Task: Counting in decimals. Prepared Assessment Task: Problems entailing SI units.

WEEK 4: Day 1

Notes to the teacher:

- In Term 2, Week 3 Day 3, learners used how to use the constant function on their calculators. They have also been using their calculators at other times over the past few weeks.
- In today's lesson, learners will practise calculator skills and become familiar with the Memory Key.
- The memory function on the calculator allows us to store a number during a calculation.
- Calculators differ slightly, so the learners will have to experiment a bit to find how their own calculator works.
- The memory keys are M, M- or M+; to clear the memory one uses the MC or CM key; to recall a number from the memory, use the MRC, RM or MR key.
- They will also practise writing number sentences to solve problems. They can use their calculators for this.

Resources: Chalkboard, textbooks, worksheets, calculators.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some multiplication tables drill and practice. Do "Clock multiplication". (See Addendum).
- Ask the learners ten multiplication sums to which they must write down the answers in their workbooks. Include a multiplication by zero and ask calculations up to 12x12.

Concept Development (20 minutes)

- Learners must take out their calculators. Ask them if they can see the M key. Ask them if they know what it means. Explain that like we can remember many things, the calculator also has a memory. However it can only remember one number at a time. Ask the learners to look for other keys to do with memory on their calculators. Write these on the board: MRC, RM or MR – memory recall; CM or MC – clear memory; M+ to add a number to the memory; M- to subtract a number from the memory.
- Work step by step to show the learners how to use the memory function. Each learner must work with you as you explain what to do. Write a calculation on the board: 35+18x75. Ask the learners which operation you would do first if you were not using a calculator? We would have to do the multiplication first because of BODMAS. However, by using the memory function on our calculators, we can work from left to right:
  - On the calculator: 35 **M+** 18x75 **M+** **RCM** (Answer 1 385)

Key in the numbers and the Memory function keys (in bold)

  - Do two or three similar examples (+ and x) together with the learners.
  - Write the key sequence on the board, and give the learners 3 calculations to work out with a partner. Check that they obtain the correct answers.
- If you are happy that the learners have grasped this, move onto a calculation where the M- key is used. Write this calculation on the board and let the learners do it step by step with you: 987-5x120. Again, discuss that we have to multiply before we subtract, but using the memory function on our calculators enables us to work from left to right.
  - On the calculator: 987 **M+** 5x120 **M-** **RCM** Note that this is almost the same procedure as done above, except when we want to subtract, we use the M- key after entering the numbers.

- Do a couple more examples on the board while the learners follow by using their calculators. Write the key sequence on the board.
- Give the learners three calculations to do in pairs. Check that they obtain the correct answers.

Problem Solving (15 minutes)

- Give the learners several problems. They can use their calculators to solve the problems. Include problems that cover concepts they have learnt, e.g. profit, discount, and fractions of a whole number. Some problems must give the learners practice in using the Memory function. The learners must:
  - Write a number sentence which shows exactly how they will calculate their answers.
  - Write down an estimated answer (by rounding off).
  - Write down a completed answer (Rand, sheep etc).
  - Show which keys they punched when using the Memory function.
  - Examples of problems:
    a) I bought furniture to the value of R5 999,65. I have paid 12 monthly installments of R320,84. How much do I still owe? (This problem entails using the Memory function.)
    b) I had R398,76 in the bank. I have saved R105,50 a month for three months. How much money do I have now? (This problem entails using the Memory function.)
    c) I owe my dentist R1 234,89. He gave me a discount of R602,78 for paying within a week. How much would I pay the dentist if I settled my account within a week?
    d) The Smith family went to the game reserve. Their paid R356,98 for their accommodation. If they had been given a R35,75 discount, what is the full price of the accommodation?

Consolidation (15 minutes)

- Give the learners 8 calculations using the Memory function on their calculators. They must write down what they entered into their calculators each time (as done in class). Do four calculations that entail adding and four that entail subtracting.

ASSESSMENT	**Informal:** Check the learners' workbooks to see whether they understand using the memory function on their calculators and whether they can write number sentences.

WEEK 4: Day 2

Notes to the teacher:

- In today's lesson we will revise units of measurement (length).
- Converting between mm, cm, m and km is not new to the learners. However, it warrants brief revision.
- Now that the learners know the concept of decimal fractions to two decimal laces, they can apply this knowledge to converting between cm and m. As there are 100 centimetres in 1 metre, 1 cm = 0,01 m (a hundredth of a metre). Similarly to Rands and cents, 105 cm = 1,06 m.

Resources: Chalkboard, textbooks, worksheets

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 20 mental calculations (written on the board) to do individually in their books. Focus mainly on addition (where re-grouping is required), subtraction, and mixed operations. Examples:
  - Find the sum of 18, 26, 42, 50 and 74
  - Find $\frac{2}{3}$ of 75
  - Calculate: 28+3x15
  - Calculate: 4x(5+8)-26
  - Find the difference between 101 and 89.
  - What number must be added to 597 to make 1 000?

Concept Development (20 minutes)

- Ask learners around the class different questions regarding measurement of length. Examples of questions:
  - How many metres in a kilometre?
  - How many times greater than a mm is a metre?
  - What is the abbreviation for kilometre?
  - What instrument would we use to measure the length of the classroom? (textbook, corridor)
  - What is the smallest unit of measurement?
  - If we were to use our bodies to approximately show a metre, how would we do that?
- In groups, give the learners some conversions to do between different units of length. See which group finishes first with the most correct: Examples:
  - How many metres and centimetres in 578 cm?
  - How many kilometres and metres in 2 109 m?
  - How many millimetres in 10 cm 5 mm?
- Take the first conversion, above, to ask the learners if they can use their knowledge of Rands and cents, and decimals to 2 decimal places, to write 578 cm in metres. If there are 100 cm in a metre, we separate the cm like this: 5/78 (dividing the hundreds from the tens). Write the comma where the / is and put a m label at the end: Therefore 578 cm is 5,78 m.

- As the learners what fraction the 78 is of a metre? It is $\frac{78}{100}$. What is the place value of the 8? (Hundredths)
  - How would we write 5 cm as metres? Similarly to how we would write 5 cents as Rands, we write 5 cm as 0,05 m. Do a few more examples like this.

Problem Solving (30 minutes)

- Learners can write number sentences to solve problems converting between units of length. Focus particularly on cm and m units as this gives them practice in decimal fractions to 2 decimal places. If you cannot find suitable examples in a textbook, make a worksheet or write problems on the board. Examples:
  - The plumber has 7 m of pipe. He uses 537 cm in the kitchen. How much does he have left?
  - My mother bought the following quantities of dress material: 1,52 m of red, 123 cm of striped, and 95 cm of blue. How much material did she purchase altogether? Answer in metres.
  - The municipality was painting the white line down the middle of the road. They had to paint a distance of 12 km 897 m. By lunchtime they had painted 7 654 m. How many more kilometres and metres did they have to paint?
- Give the learners a variety of other problems to solve to give them practice in writing number sentences, estimating answers, checking answers by substitution or working backwards from the answer.
- Walk around and check that the learners are working correctly. Assist any learners who are having difficulty with problem solving techniques.

ASSESSMENT	**Informal:** From the learners' verbal responses and written work, you will be able to tell whether they can solve problems that entail converting between different units of length.

WEEK 4: Day 3

Notes to the teacher:

- Today units of measurement, mass and capacity, will be revised.
- By now the learners should be competent in converting between different units of measurement, so this concept will be revised briefly and the focus will be on problem solving.
- The more practice learners are given in writing number sentences and solving problems, the more competent they will become.
- Learners must also be encouraged to always estimate their answers by rounding off. They must be encouraged to use different strategies to check their answers. The most basic way of checking an answer is to ask oneself, "Is the answer reasonable? Does it make sense?" Thereafter, methods such as working backwards from the answer or substituting smaller numbers can be used.

Resources: Chalkboard, textbooks, worksheets. Prepared Multiplication tables test.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Use today's lesson for Assessment Task 1. Give the learners 20 multiplication sums to do. Include some multiplication by zero and multiplication up to 12x12.

Concept Development (15 minutes)

- Write the following soup recipe on the board:

VEGETABLE SOUP

180 g packet soup mix
4 litres water
450 g soup bones
200 g carrots
250 g potatoes
100 g onion
410g tin whole peeled tomatoes
250 g chopped celery
100g broken spaghetti
25 ml salt
20 ml Worcestershire sauce
1 ml curry powder
1,5 ml of pepper
30 ml finely chopped parsley

- Ask the learners in their groups to draw two columns. The first column must have the heading Capacity and the other column, the heading Mass. They must write the soup ingredients down in the correct column, from the smallest to the largest. Discuss their answers with them.

- Ask questions such as:
  - How many ml of water in this recipe?
  - If I add the mass of all the vegetables together, how many grams of vegetables do I have? How many kilograms and grams is this?
  - The butcher sold me 1 kg of soup bones. I put the bones I didn't use into my freezer. How many grams of bones are in my freezer? How many kilograms is this?

- I bought a 500 g packet of spaghetti. How much do I have left? How many such packets would make 3 kg?
- I could only buy a 600 g tin of whole peeled tomatoes. How much do I have left? What is the mass of two such tins of tomatoes? Answer in kilograms and grams.

Consolidation (10 minutes)

- Give the learners 10 to 15 conversions between different units of mass and capacity to complete. Examples:
  - 7 kg 546 g = …….g 200 g = …….. kg ……. g 1 658 ml = …… l

Problem Solving (20 minutes)

- Learners can use their calculators to solve problems entailing conversions and calculations of units of mass and capacity. However, take note of the points made in "Notes to the Teacher" (above). Walk around and check that learners are doing what they were instructed to do and assist learners who are having difficulty. You should be able to find suitable problems in the textbooks. If not, make a worksheet or write problems on the board. Examples:
  - My cake needs 250 g flour, 200 g sugar, 1 kg 100 g of dried fruit. If I double this recipe, what is the total mass of these ingredients?
  - A truck carried 56 sacks of mealies, each with a mass of $12\frac{1}{4}$kg. The truck is certified to carry 700 kg. Is the truck overloaded?
  - A leaking tap drips 5ml every minute. How many litres of water will be wasted in a week?

ASSESSMENT	**Informal:** Check the learners as they work whether they understand conversions between units of mass and capacity. Make sure they are able to write number sentences and that their problem solving abilities are improving.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 9: Perform mental calculation involving multiplication of whole numbers to at least 12x12.

WEEK 4: Day 4

Notes to the teacher:

- In the next two lessons, you can revise all work done so far this term.
- From your informal assessments, you should know your learners' areas of weakness, so pay particular attention to these areas while revising. However, if you feel there are no particular areas of weakness, follow the revision laid down below.
- Make sure this time of revision is structured and meaningful.
- In this lesson, the learners' abilities to do tally charts and pictographs will be formally assessed.

Resources: Prepared Assessment Tasks. Chalkboard, textbooks.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- As part of Assessment Task 1, give the learners 20 or more addition and subtraction calculations to do. Write down the sums. They must work out the answers in their heads and write down the answers only. Include some addition which requires re-grouping. Include subtraction and addition which require compensating.

Revision (20 minutes)

- Revise the following concepts with the learners. It should work well if you briefly revise a concept, and then give the learners two or three examples to complete in their books, and check their work. After that, revise another concept, give the learners examples to complete, and check their understanding of that concept. During this lesson, depending on your learners' needs, revise:
  - Recognising and making equivalent common fractions with 1- and 2-digit denominators. (refer to Week 2, Day 4 and Week 3, Day 3)
  - Recognising decimal fractions to 2 decimal places, their equivalent common fractions, adding and subtracting decimal fractions to 2 decimal places. (refer to Week 3, Day 3, 4 and 5)

Assessment Task (30 minutes)

- Assess the learners' ability to use tallies and tables and to draw pictographs. Give them a task such as the following:
  - The teacher was concerned because her learners seemed to get tired. She did a survey to check what they were having for breakfast. She gave them the following to choose from: bread (b), porridge (p), cereal (c), other (o) and no breakfast (n). As the learners walked into the classroom, she wrote down their responses as follows:

b	b	p	o	n	n	o	p	p	c	p
c	b	b	p	p	c	c	n	p	p	p
b	o	b	p	b	d	d	p	b	b	p

  - Draw a tally chart to show this information.
  - Choose a symbol to represent a suitable number of learners and draw a neat, properly labelled pictograph to display this information.

- In the pictograph, check that the learners have a key (e.g. ✱= 3 learners), that their choice of how many learners are represented by the symbol is appropriate (all the above numbers are divisible by 3, so it would be appropriate to have the symbol representing 3 learners), that they have a heading and labels showing which breakfast is eaten by which learners.	
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 9: Perform mental calculation involving addition and subtraction. • LO 5 AS 4: Organise and record data using tallies and tables • LO 5 AS 6: Draw graphs and interpret data including pictographs with many-to-one correspondence and appropriate keys

WEEK 4: Day 5
Notes to the teacher: • In today's lesson, we will continue with revision. • Base the revision you do on what you feel your learners need to revise. You will know this from your observation of their progress in learning different concepts. • If you do not feel your learners have specific areas of weakness, revise the concepts not revised yesterday (specified in the lesson plan, below). • Make sure the revision time is meaningful. Help learners who have difficulty with different concepts. • Often learners understand a concept while they are working on that concept, but later they forget it. That is why it is important to keep going back to previously taught concepts. **Resources:** Chalkboard, textbooks, worksheets. Prepared Assessment Task.
DAILY ACTIVITIES
Oral and Mental Activity (10 minutes) • Count forwards and backwards in decimals as part of Assessment Task 1. Give the learners ten sequences to complete by writing the next six numbers in each sequence. Examples: - 5,17; 5,25; 5,33; 5,41; …….. - 4,1; 4,09; 4,08; 4,07; …….. - 7,14; 7,16; 7,18; …… - 9,75; 9,5; 9,25; …….. **Revision** (35 minutes) • Revise the following concepts with the learners. It should work well if you briefly revise a concept, and then give the learners two or three examples to complete in their books, and check their work. After that, revise another concept, give the learners examples to complete, and check their understanding of that concept. While the learners are working, walk around and help those who have forgotten the concepts or are still unsure of the concepts. During this lesson, depending on your learners' needs, revise: - Number patterns in tables, flow diagrams (Refer to Week 2 Day 5 and Week 3 Day 1) - The commutative, distributive and associative properties of numbers (refer to Week 1, Day 3) - Order of operations (refer to Week 1, Day 4 and 5) **Problem Solving (Assessment Task)** (15 minutes) Give the learners six problems which entail converting between different SI units (Length, Mass and Capacity). You will also assess the learners' ability to write a number sentence for these problems.

ASSESSMENT	**Informal:** By doing this revision, you will be able to assess which concepts are still not fully understood by your learners.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 1: Count forwards and backwards in decimals. • LO 4 AS 1: Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement) • LO 2 AS 4: Write number sentences to describe a problem situation within a context.

Grade 6: Week 5

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 4, 10	**Milestones:** • Recognise the place value of whole numbers to a minimum of 8-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including adding and subtracting in columns.

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

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Assessment Task 1	Place value: 8-digit numbers	Place value: 8-digit numbers	Adding in columns	Subtracting in columns
Resources	Prepared Assessment Task	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets	Chalkboard, textbooks, worksheets

WEEK 5: Day 1
Notes to the teacher: • Some assessments have been completed towards Assessment Task 1. In today's lesson, the rest of the concepts taught so far this term must be assessed. • It is important that you read the requirements for Assessment Task 1 carefully to ensure that your learners are being properly assessed according to these requirements. **Resources:** Prepared Assessment Task
DAILY ACTIVITIES
Oral and Mental Activity (10 minutes) • Play Tables King (see Addendum for instructions) • Do some counting activities. You can let the learners count one by one around the class, or let one learner count a few times, and another learner follows on. You can also let the whole class count together, or small groups of learners count together, then the next group counts on from where they left off. Try to vary it to keep the learners alert. **Assessment Task** (50 minutes) • Your Assessment Task should include a few examples of: - Equivalent fractions with 1-digit and 2-digit denominators and decimal numbers to 2 decimal places; - Interpreting accounts and discount; - Addition and subtraction of decimal fractions to two decimal places; - Using a calculator; - Solving number sentences; - Determining rules and relationships verbally, in flow diagrams, by number sentences and in tables. • If there are any concepts that you have already assessed formally, you can also re-assess these.

ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 5: Recognise and use equivalent forms of common fractions with 1-digit and 2-digit denominators and decimal fractions to at least 2 decimal places. • LO 1 AS 6: Solve problems in context such as financial (reading and interpreting accounts and discount) • LO 1 AS 10: Use a range of techniques to perform calculations with whole numbers including using a calculator • LO 2 AS 5: Solve or complete number sentences by inspection or by trial-and-improvement, checking the solution by substitution; • LO 2 AS 3: Determine the different descriptions of the same rule or relationship represented verbally, in flow diagrams, by number sentences and in tables.

WEEK 5: Day 2

Notes to the teacher:

- In today's lesson, the focus is on Place value of 8-digit whole numbers.
- Learners have had plenty of practice in recognising the place value of 7-digit numbers, including building up and breaking down of such numbers, so this extension to 8-digit numbers should not present any real difficulty. However, it is always advisable to re-visit place value. Learners must be constantly reminded that we only use 10 digits in our number system, and the value of those digits depends on where they are placed in a number.
- Learners often have difficulty in saying or reading large numbers, so plenty of time should be spent practising this.

Resources:

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a square such as the following to complete. Note, *this is a completed square for your guidance*. Do *not* fill in *any* numbers within the block; only fill in the numbers printed in bold, which are the totals that the learners must obtain by using the correct order of operations, horizontally and vertically. They can work in their groups or with a partner. If the learners are unable to do this without any numbers filled in, fill in one or two numbers, such as the 2 in the top, left-hand corner. If they are still unable to make any progress, fill in another number.

2	+	3	x	8	**26**
x		-		x	
9	+	5	x	6	**39**
-		+		-	
1	+	7	+	4	**12**
17		**5**		**44**	

- If the learners complete this quickly, do a round or two of Tables King (see Addendum).

Concept Development (20 minutes)

- Tell the learners that in the last census in South Africa, it was found that the total population was 40 583 573. Ask the learners if anybody is able to say that number in words. Give a few learners the opportunity to try.
  - If learners have difficulty reading this size number, it will help them if you tell them to think of a train. A train is made up of carriages. In the number train, only three digits (filling up from the right hand carriage) can fit in a carriage. We can write the above number in a number train like this:

4 0	5 8 3	5 7 3
Million	Thousand	

- The number in each carriage can now be read as a unit. The above number will be read as Forty million, five hundred and eighty three thousand, five hundred and seventy three.
- In the same census, it was found that 21 781 807 people lived in towns and cities. Ask the learners to say this number. Write it, on the board, in a number train and practise saying it.
- Repeat with another 8-digit number.

- Revise the place value of the digits in the number 2<u>1</u> 781 807. Up until now, we have only been working with 7-digit numbers. What is the value of the <u>1</u>? It is a million. Ask the learners if they can think what the place value of the 2, next to the <u>1</u>, is. It is Ten Million. A digit is always ten times greater than the digit to its right.
- Say numbers, such as the following, one at a time. Ask learners, who think they can write the number, to come and do so on the board. Give as many learners as possible a turn. Other learners can check on their friends. Make the numbers progressively more difficult:
  - 20 million (20 000 000)
  - 30 million (30 000 000)
  - 11 million (11 000 000)
  - 38 million (38 000 000)
  - 42 million, 1 hundred thousand (42 100 000)
  - 17 million, 231 thousand and 5 (17 231 005)

Consolidation (15 minutes)

- Tell learners to write 8 columns in their books (Leave a space or do a double line to separate each set of three digits). At the top of each column, they must write the place value of that column. They must fill in the correct numbers according to instructions you give them. Write these instructions on the board. Do 5 like this. The first one is filled in as an example:

	TM	M
1.	8	4
2.		
3.		
4.		
5.		

H Th	TTh	Th
6	7	1

H	T	U
6	2	5

  - Write a number with a 5 in the Units place, 7 in the T Th place, 8 in the T M place, 1 in the Th place, 4 in the M place, 6 in the H Th and H place and a 2 in the T place. Write this number in words.
- Learners must write in numbers (give them 5 to complete): Twenty five million, six hundred and thirty three thousand, four hundred and sixty six.
- Arrange five 8-digit numbers in ascending order (give them 3 to complete):
  - 54 686 789; 54 868 789; 45 686 789; 45 868 789; 54 686 879
- Write the number that is:
  - 5 million more than 23 456 745

- 20 million more than 43 569 231
- 30 million less than 58 978 453 (Give about 6 examples like this)

Problem Solving (15 minutes)

- Give the learners a few problems to complete such as:
  - The urban population of South Africa in 1999 was 21 781 807. By 2004, it had increased by 10 million. What was the urban population in 2005?
  - The rural population of South Africa was 28 450 231 in 2001. By 2005 it had decreased by 20 million. What was the rural population in 2005?
  - In 2004, the national budget for education was R79 256 135. This was R40 million more than in 2002. What was the budget for education in 2002?

Note: in the above examples, learners do not need to do an addition or subtraction sum. They must only increase or decrease the digit of the appropriate place value

ASSESSMENT	**Informal:** Mark the learners' class work to see that they understand the place value of digits in an 8-digit number

WEEK 5: Day 3

Notes to the teacher:

- Today's lesson continues with place value of 8-digit numbers but we will focus more on expanded notation and building up of numbers. The learners have had plenty of practice with expanded notation, so it should not be difficult for them to extend their knowledge to include Ten Millions.
- Give the learners as much practice as possible in saying large numbers.

Resources: Chalkboard, textbook, worksheets

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count forwards and backwards in millions. Do not start at zero. Vary this activity by asking one learner to count for a while, then another learner to take over, then the next learner to count backwards from where the previous learner stopped. You can let groups of learners count, or all the girls count, then all the boys count. Make sure all the learners are actively involved and can actually count. Examples of counting:
  - Count forwards in millions from 28 million.
  - Count backwards in millions from 41 million.
  - Count forwards in 10 millions from 35 million.
  - Count backwards in 3 millions from 71 million.
  - Count forwards in 8 millions from 22 million.
- Give the learners 5 examples similar to the above to complete individually in their workbooks. Example:
  - Write the next three numbers: 32 000 000; 27 000 000; 22 000 000; …..

Concept Development (20 minutes)

- Write an expanded number on the board (quite high up), e.g. (5x100 000)+(2x100)+(7x10 000 000)+(8x10)+(9x1)+(6x1 000)+(2x1 000 000)+(6x10 000).
  - Divide the lower part of the board into five equal columns to create work space for 5 learners to write the number formed from the expanded number you wrote.
  - After they have finished, let the other learners check. Make sure they wrote the correct number: 72 566 289.
  - Ask a few learners in the class to say the number in words.
  - Ask the learners what we call it when we write a number as you wrote it (i.e. in expanded notation)
- Repeat the above with another one or two expanded numbers, giving different learners the chance to write the number formed on the board.
- Now work the other way around to practice writing in expanded notation. Write an 8-digit number on the board. Ask a few learners to say the number in words and then let learners take turns to come and write different part of the expanded notation on the board. Example:
  - 67 543 207
    = (6x10 000)+(7x1 000 000)+(5x100 000)+(4x10 000)+(3x1 000)+(2x100)+(7x1)

NOTE: If there is a 0 in the number, it must not be included in the expanded number. In the above example, there are no 10s. We do not write (0x10).

Expanded notation must always start on the left with the greatest place value. When asking learners to build up numbers, one can write the expanded version in random order to make them think and help them understand place value.

- After checking the above, give a few more learners a chance to write numbers in expanded notation on the board.

Consolidation (30 minutes)

- The learners can work individually in their work books to complete some written work. Give the learners:
  - Five 8-digit numbers to write in expanded notation.
  - Five expanded numbers from which they must form an 8-digit number. Write these in random order.
  - Five or more numbers with an underlined digit. They must write down the value of the underlined digit.
  - Examples such as: Write down the value of the 6 in the following numbers: 6 123 897; 456; 3 567 213; 64 530 254; 12 564 789.
  - 8 digits that they must use to write down the largest and/or smallest number they can make (not starting with 0): 0, 2, 3, 4, 5, 9, 9, 7
- While they are busy, walk around and help any learners who are having difficulty.

ASSESSMENT	**Informal:** Check the learners' class work to ensure that they understand this concept.

WEEK 5: Day 4

Notes to the teacher:

- The focus of today's lesson is on adding in columns.
- For Assessment Task 2, learners must be able to add 8-digit numbers together.
- It is also important that numbers comprised of different numbers of digits can be added. For example, the learners should be able to add a 5-digit and 7-digit number together. Today's lesson will give the learners the opportunity to practise this.
- At this stage, learners should also be able to add more than two numbers together. When faced with a calculation or problem entailing adding more than two numbers together, learners often add two numbers only, and then do another sum to add the next number. This is unnecessary. All the addition must be done in one calculation.
- Learners must always be encouraged to check their answers. We normally add from the top to the bottom number. Check by adding from the bottom to the top.
- Always encourage learners to re-group numbers (in their heads) to make addition easier.
- Make sure learners know the vocabulary associated with addition: plus, sum of, total, altogether.

Resources: Textbooks, worksheets, chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" (see Addendum, Mental strategies).
- Give the learners 10 addition sums to work out mentally. Write the sums on the board and the learners must write down the answers only in their workbooks. Afterwards, they can swop books and mark each other's work. Discuss the different strategies needed to make the calculations easier. Examples:
  - 58+54+46+42= (Learners need to re-group)
  - 5 455+ =10 000
  - 899+253= (Learners need to compensate: 900+252)

Concept Development (25 minutes)

- Give the learners a problem such as the following to solve in their groups: *12 562 616 people live in Gauteng. 11 235 481 people live in KwaZulu-Natal. What is the total population of these two provinces?* (Let one or two learners read the problem aloud. The more practice they get in reading large numbers, the better.)
  - After enough time, ask learners from different groups to come and show how they solved the problem. If any of the learners did not add in columns, they will have taken much longer than those who did. Point this out to them and tell them that they are now required to add in columns.
  - Go through the process of adding in columns. Involve the learners in each step by asking them questions, e.g. Where do I start adding? How much is 6+1? Where do I write the answer? What do I do next?

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

Always check that the sum has been written down correctly. Learners often copy down incorrectly. Remember to always line up the digits, starting with the units, in their correct place value positions. First add the digits in the units column and then work to the left.

- Ask a few learners, in turn, to read the number. When problem solving, the answer must be complete. 23 798 097 is the total population.

- Give the learners a problem to solve in their groups that entails adding more than two numbers. Example: *At the soccer match, there were 5 428 men, 2 459 women and 1 546 children. How many people were there altogether at the soccer match?*
  - Walk around and see which groups are adding all three numbers in one calculation.
  - Afterwards ask a learner from that group, and another learner from a group which did the calculation in two sums, to come and show their methods on the board. The learners who did the calculation as one will have finished more quickly.
  - Go through the calculation afterwards, with input from your learners.

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

Remember to always line up the digits, starting with the units, in their correct place value positions. Start adding from the right hand (units) columns. If the total of the digits you are adding is a 2-digit number, write down the second digit and carry the first digit over to the next column to the left. Check by adding again, preferably starting with a different digit from the first time. For example, if, in the units column, you added 8+9+6, check by adding 6+9+8.

  - Make sure the answer is complete: There were 9 433 people altogether.

- Give the learners a third problem to solve in groups. This problem must entail adding numbers with different numbers of digits. For example: *By 09:00 on election day, 5 214 people had voted. In the next hour 359 people came to vote, and by 17:00 another 10 622 people had voted. How many people had voted altogether by 17:00?*
  - After the learners have completed the calculation, go through it with them on the board, involving them by asking questions:

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

Line up the digits in their correct place value columns starting with the units. This is crucial. Some people write the smallest number at the top and the largest number at the bottom, but this is not necessary as long as the digits are correctly lined up in their columns.

  - Check the answer by adding again.
  - Make sure the answer is complete: 16 195 people had voted.

Problem Solving (25 minutes)

- Give the learners a variety of addition problems to solve. Ensure that the numbers they have to add contain different numbers of digits. If there are learners who still do not know how to add in columns, sit with them in a small group and work with them. You will find examples of problems in the textbook. If you cannot, make a worksheet or write the problems on the board. For each problem, they must:
  - Write a number sentence
  - Estimate the answer by rounding off (always practise rounding off)
  - Make sure their answer is complete
  - Check by adding again (or using a calculator once they have finished all the work).

WEEK 5: Day 5

Notes to the teacher:

- Learners have had a fair amount of practice in subtracting in columns. Once they have grasped this concept, they should not have difficulty in subtracting numbers composed of 5, 6, 7 or 8-digits. Today's lesson will focus on subtracting larger numbers.
- Learners must also be able to subtract numbers which have different numbers of digits, e.g. a 4-digit number from a 6-digit number.
- Make sure the learners know the vocabulary associated with subtraction: less than, minus, take away, difference.
- Check subtraction sums by adding.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners ten or twenty subtraction sums to work out mentally. Write the sums on the board and the learners must write the answers only in their workbooks. Afterwards, they can swop books with a classmate and mark each other's work. Examples:
  - Find the difference between 45 and 67.
  - If I subtract 37 from a larger number, my answer is 88. What is the larger number?
  - I had 3 R20 notes. I bought food which came to R47. How much change did I get?

Concept Development (15 minutes)

- Write the following table, showing the area (size) of each of the provinces of South Africa. Ask different learners to read the numbers in turn. Ask the learners, in their groups, to find the difference in land area between the largest and smallest provinces.

	Eastern Cape	Free State	Gauteng	Kwazulu-Natal	Mpumalanga	Northern Cape	Northern Province	North West	Western Cape
Square km	169 580	129 480	17 010	92 100	79 490	361 830	123 910	116 320	129 370

  - The two numbers contain different numbers of digits. Walk around the class and make sure that the learners are lining the numbers up correctly in columns, starting with the units.
  - After enough time, ask a learner who did the calculation correctly to come and show his/her method to the class. As the learner does the sum, explain the method to the class and involve the learners by asking questions.

$$\begin{array}{rrrrrr} & 3 & \cancel{6}\,5 & {}^{1}1 & 8 & 3 & 0 \\ - & & 1 & 7 & 0 & 1 & 0 \\ \hline & 3 & 4 & 4 & 8 & 2 & 0 \\ \hline \end{array}$$

Ensure that the digits are in their correct place value columns, starting with the units.
Work from right to left.
Remind the learners that they cannot take 7 (7 000) from 1 (1 000), so they have to "borrow". They often want to say 7-1, so watch for and correct this mistake.

  - Make sure that the answer is complete: The difference is 344 820 km^2.
  - Check by adding the difference (answer) to the subtrahend (number being subtracted). This must equal the minuend (number being subtracted from, the top number in this sum).

- Do another problem or two entailing subtraction of two 8-digit numbers. Learners can work in pairs. Afterwards go through the method with them on the board.

Problem Solving (20 minutes)

- Find problems entailing subtraction in the textbook, make a worksheet or write problems on the board. Give the learners about four problems. Help learners in groups who are having difficulty with the concept of subtraction. In each problem, they must:
  - Write a number sentence
  - Estimate the answer by rounding off (show their estimated answer)
  - Do the calculation.
  - Make sure their answer is complete.
  - Check their answer by doing an addition sum.
- Give the learners two addition problems (or problems entailing mixed addition and subtraction) to do as well. Example:
  - There were 24 352 mealie plants on the farm. 3 895 were burnt in a fire. The farmer then planted 6 524 more plants. How many mealie plants does he now have?

Consolidation (15 minutes)

- Give the learners 6-8 addition and subtraction calculations. These can be completed for homework. Include:
  - Addition of more than 2 numbers with different numbers of digits.
  - Subtraction of numbers with different numbers of digits.
  - Subtraction of 8-digit numbers.

ASSESSMENT	**Informal:** Assess from the learners' group work, verbal responses and written work whether they are able to subtract in columns.

Grade 6: Week 6

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 8, 10 **LO 2 AS 4** **LO 3 AS 7**	**Milestones:** • Estimate and calculate by selecting and using operations appropriate to solve problems that involve multiplication of at least whole 4-digit by 2-digit numbers. • Use a range of techniques to perform written and mental calculations with whole numbers including long division. • Write number sentences to describe a problem situation within a context. • Draw and interpret sketches of simple 3-dimensional objects from different positions.

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

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Content Focus:	Multiplication: 4-digit by 2-digit numbers	Problem solving: addition, subtraction, multiplication	Long division	Long division	Drawing 3D objects.
Resources	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook	Chalkboard, worksheets, textbook, Dotted paper

WEEK 6: Day 1

Notes to the teacher:

- The focus of today's lesson is on multiplying 4-digit by 2-digit numbers.
- The Assessment Standards are not specific about whether numbers of this size must be multiplied in columns. However, the Assessment Standards do state that the learners need to be able to multiply in columns (without specifying the size of the numbers). As multiplying in columns is the most efficient way of multiplying, the learners ought to be able to multiply 4-digit by 2-digit numbers this way.
- Constantly remind the learners that the left-hand digit of a 2-digit number has the place value of 10s. Therefore, when multiplying, they must first write down a 0.
- As with any operation in columns, lining up digits, starting with the units, is of the utmost importance. Make sure your learners space their work evenly and the digits are written in clear columns.
- Although multiplication is commutative (4x3=3x4) we write the larger number on the top when multiplying in columns.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners the following to complete, individually in their workbooks:

8x10=	8x20=	8x30=	8x40=	8x50=
7x10=	7x40=	7x60=	7x80=	7x90=
40x10=	40x20=	40x40=	40x60=	40x70=
35x10=	35x20=	35x40=	35x60=	35x80

- The learners can swop books and mark each other's work.
- Ask them what they notice when they multiply by 10s and multiples of 10. There is always a 0 at the end of the number (answer).

Concept Development (20 minutes)

- Write a problem such as the following on the board. *There are 24 sections in the soccer stadium. Each section can seat 2 384 people. How many people can fit in the soccer stadium?*
  - Divide the lower part of the board into 4 or 5 columns to give 4 or 5 learners working space to work out the problem.
  - After the learners have finished, ask the rest of the class if they see any mistakes. Go through the calculation with the class. Include the learners by asking them questions such as: what is 4x4? Where do I write the answer? What do I do next?

$$\begin{array}{cccc} {}^{1}2 & {}^{3}3 & {}^{1}8 & 4 \\ & & 2 & 4 \\ \hline 9 & 5 & 3 & 6 \end{array}$$

Write the numbers down, lining up the units.
Multiply each of the top numbers by 4, starting with the units.
4x4=16. We cannot write 16 in the units column. Carry over 10 to the 10s column.
Multiply 4x8, then add 1. Often learners add first, then multiply. Look out for this error.

	2	13	8	4
			2	4
	9	5	3	6
4	7	6	8	0
5	7	2	1	6

We have finished multiplying by the 4. Now we must multiply by the 20.
Put down a 0.
Multiply from left to right, lining up the digits correctly.
Add the two rows of numbers you have multiplied, starting with the units.

- Make sure the answer is complete: 57 216 people (can fit in the stadium)

- Repeat with another problem, giving other learners the chance to do the sum on the board.

Problem Solving (15 minutes)

- Find problems for the learners to solve, individually in their workbooks, in textbooks. If you cannot find any suitable problems, make a worksheet or write some problems on the board. Give the learners 8 problems to solve. Some learners might finish all. Make sure all the learners complete at least 5. If any learners are still unsure of this concept, work with them in a small group.

Consolidation (15 minutes)

- Give the learners 6 multiplication sums to complete. Do not make all the sums 4-digit by 2-digit numbers. Include, for example, 3-digit by 2-digit, 4-digit by 1-digit. This ensures that the learners can adapt to previously learnt concepts. Work can be completed for homework.

ASSESSMENT	**Informal:** You will be able to asses whether the learners have grasped this concept by observing their work on the board, their oral responses, and how well they do their written work.

WEEK 6: Day 2

Notes to the teacher:

- In today's lesson, the focus will be on problem solving entailing addition, subtraction and multiplication.
- It is always advisable to return to previously learnt concepts, as learners often manage a concept while that concept is being focused on, then do not know how to apply it later. This shows that there is not real understanding of that concept.
- Make sure the learners always write a number sentence, as this helps them clarify their thinking.
- They must estimate their answers by rounding off.
- They must check their answers.
- Their answers must always be complete.
- If there are learners who you know do not understand a particular concept, work with them in a small group. A lesson like this provides you with an ideal opportunity to do this.
- Also, walk around and check the learners' work to ensure they are doing their work properly and understand what they are doing.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round of Tables King (see Addendum, Mental Strategies).
- Give the learners a multiplication tables speed test.
  - Give the learners 20 sums, and a time limit of 3 minutes.
  - Include multiplication up to 12x12 and multiplication by 0.
  - Afterwards they can swop books and mark each other's work.

Problem Solving (50 minutes)

- Make a worksheet with a variety of problems entailing addition, subtraction and multiplication (in random order). For each problem, learners must estimate their answer by rounding off, write a number sentence, do the calculation, check their calculation and write a complete answer. Include:
  - Addition of more than 2 numbers (in columns).
  - Addition of numbers containing different numbers of digits (in columns).
  - Subtraction (in columns)
  - Mixed addition and subtraction in one problem, e.g. *In 1999, there were 23 562 people living in a town. Over the next five years, another 3 256 people arrived to work on a project. When the project was completed, 4 258 people left the town. How many people were left in the town?*
  - Multiplication up to 4-digit by 2-digits, but include some multiplication of smaller numbers (in columns)
  - Mixed operations. For example: *On Monday, 12 985 people from other countries were in Durban to watch a World Cup soccer match. Over the next two weeks, 18 aeroplanes, each carrying 235 passengers who were coming to watch the soccer match, landed in Durban. How many people were there to watch the match?*
  - Include some problems that incorporate measurement, e.g. mass and length.

WEEK 6: Day 3

Notes to the teacher:

- Today the learners will be introduced to Long Division.
- This is often a confusing process. Therefore, start with small numbers so that the learners can focus on the process and not on working out, for example, how many 7s in 56.
- Long Division is an algorithm. The learners cannot work out the method themselves. However, do not just stand in front of the class and explain. Involve the learners by asking questions.
- There are four steps, which are repeated depending on the size of the numbers being divided. The steps, in order, are: **D**ivide, **M**ultiply, **S**ubtract, **B**ring down. Use the first letters of these words to make the Division Family: **D**addy (the head of the house, so he must go first), **M**ommy (the next senior person), **S**ister (girls first!) and **B**rother.
- In Long Division, we deal with each digit as a number and do not worry about its place value.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners the a table such as the following, containing at least 15 rows, to complete, individually in their workbooks:

5x8=	8x5=	40÷8=	40÷5=
7x9=	9x7=	63÷7=	63÷9=

Concept Development (20 minutes)

- Introduce the learners to the Division Family, who will help them with long division. The family members are Daddy (for Divide), Mommy (for multiply), Sister (for Subtract) and Brother (for Bring Down). Today, we will only worry about Divide, Multiply and Subtract, so write D, M and S under each other on the board.

- Write the following on the board. $2\overline{)6}^{\,3}$. Ask the learners if they know what this means (this is new to them). From looking at it for a moment, some of the learners might be able to tell you that you have divided 6 by 2. What is the quotient (answer)? It is 3.
  - "Daddy" has done his job for now, so put a tick next to D
  - How do we check that? We multiply the divisor (2) by 3 = 6.

D ✓
M
S

$$\begin{array}{r} 3 \\ 2\overline{)6} \\ 6 \end{array}$$

D ✓
M ✓
S

We have multiplied, so tick next to M. Take note of where we write each digit.

$$\begin{array}{r} 3 \\ 2\overline{)6} \\ \underline{6} \\ 0 \end{array}$$

D ✓
M ✓
S ✓

We then subtract 6 from 6. The answer is 0. We cannot divide 2 into 0, so our sum is complete and we can put a tick next to S for subtract.

- Clean the board. Write this sum on the board: 8÷4. Ask the learners if anyone knows how to write it correctly so that you can divide using the method you have just shown them.

  Tip: The number being divided *into*, is placed *inside* the little "house" or "cave"

  - Once the above sum has been written correctly: $4\overline{)8}$, go through the method, above, slowly and clearly with the learners. Make sure, by asking questions, that they participate.
  - Even if learners can see the answer, straight away in their heads, it is important that they follow the steps shown above, as this is the foundation for more difficult long division sums.
- Now move on to 2-digit dividends (numbers being divided into).
  - Write the following on the board: 18÷3. Ask a learner to come and write it correctly on the board. Work through the steps with the learners as follows:

$$\begin{array}{r} {}^{*}6 \\ 3\overline{)18} \end{array}$$

D ✓
M
S

3 does not divide into 1. Put a * or • above the 1.
Divide 3 into 18. Write the answer (6) above the 8 of 18.
This is very important. Emphasise it now, or learners will get very confused when they start dividing larger numbers.

  - Continue until you have completed all the steps in the example above.
  - Repeat with e.g. 24÷4.
  - Give the learners two 2-digit divided by 1-digit calculations to do in their groups. Afterwards, check that they are writing each digit in its correct place and ticking off next to D, M and S as they complete each step of the process.

Consolidation (15 minutes)

- Give the learners about 10 sums to do with a partner. They must follow the steps learnt today, even if they feel they know the answers without any working out.
  - Make sure they are sums which entail the same rule as learnt during this lesson (i.e. the first number of the dividend is smaller than the divisor. There must not be any remainders).
  - They can discuss each step and check on each other. If there is confusion or disagreement, they must ask you for help. Walk around and check that all the learners are grasping this method. If not, work with those learners to help them understand.
  - Examples that entail the rule learnt today include:

    28÷4 32÷8 42÷7 40÷5 56÷7
- Give the learners about 10 sums to do individually in their workbooks. Make sure they are sums which entail the same rule as learnt during this lesson (i.e. the first number of the dividend is smaller than the divisor. There must not be any remainders).

ASSESSMENT	**Informal:** You will be able to assess the learners' grasp of this concept and method from their participation in class and their written work.

WEEK 6: Day 4

Notes to the teacher:
- Today we will continue with Long Division.
- Hopefully the slow pace of yesterday's lesson enabled your learners to grasp the first steps of the method of Long Division.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)
- Do some Clock Multiplication and Division (see Addendum, Mental Strategies).
- Revise factors with the learners.
  - Ask them what we mean by a factor – it is a number that divides into another number without a remainder.
  - Factors always come in pairs, e.g. factors of 12: 1 and 12 (1x12=12); 2 and 6 (2x6=12); 3 and 4 (3x4=12). If the two numbers in the pair are the same, we only write that number down once, e.g. factors of 9: 1 and 9 (1x9=9); 3 (3x3=9. We only write the 3 down once)
  - Learners can work in pairs to find all the factors of: 24, 32, 35; 42; 48; 60 (or any numbers you choose)

Concept Development (25 minutes)
- Briefly revise what was learnt yesterday. Tell the learners that today they are going to do more difficult work, which entails using the **B** (bring down) in the process.

D ✓
M ✓
S
B

- Write a sum such as the following on the board: $3\overline{)96}$
  - Ask the learners what we do first? We divide. How many 3s in 9? 3. Where do we write the 3? Above the 9. Put a tick next to divide. $\begin{array}{r} 3_ \\ 3\overline{)96} \\ 9_ \\ 0 \end{array}$. Multiply 3x3=9. Put a tick next to

D ✓
M ✓
S ✓
B

  - multiply. Subtract 9-9=0. Put a tick next to S.
  - There is still another digit to divide into. We bring down the 6. It is useful to draw an arrow showing that the 6 is being brought down.
  - Put a tick next to B for bring down. $\begin{array}{r} 3_ \\ 3\overline{)96} \\ 9\downarrow \\ _06 \end{array}$

D ✓
M ✓
S ✓
B ✓

- We have ticked off all the steps, so it is back to Divide. Divide the 6 by 3. The answer is

2. Tick off divide.

$$\begin{array}{r} 32 \\ 3\overline{)96} \\ 9\downarrow \\ 06 \end{array}$$

D ✓ ✓
M ✓
S ✓
B ✓

- Multiply the number you have just written down by the divisor, i.e. 2x3=6. Tick off M.

$$\begin{array}{r} 32 \\ 3\overline{)96} \\ 9\downarrow \\ 06 \\ 06 \end{array}$$

D ✓ ✓
M ✓✓
S ✓
B ✓

- The next step is to subtract. 6-6=0. There are no more numbers to bring down. We cannot divide 3 into 0, so our sum is complete.

$$\begin{array}{r} 32 \\ 3\overline{)96} \\ 9\downarrow \\ 06 \\ 06 \\ 00 \end{array}$$

D ✓ ✓
M ✓✓
S ✓ ✓
B ✓

- Do two or three more examples with your learners, involving them by asking questions, e.g. what must I do next? How much is 4x3? How many 2s in 8?
- Give the learners two sums to do with a partner. Check that they are grasping this method. Walk around and help learners who are having difficulty.
- Now we will move on to slightly different sums. In these, when the learners subtract, the answer will not be 0. Write a sum like this on the board: $4\overline{)96}$. Go through the steps as above.

$$\begin{array}{r} 24 \\ 4\overline{)96} \\ 8\downarrow \\ 16 \\ 16 \end{array}$$

When 8 is subtracted from 9, the difference is 1. After bringing down the 6, we have the number 16. 4 must be divided into 16.

Consolidation (25 minutes)

- Give the learners 10 sums to do with a partner. They can discuss what steps to do next and check on each other. If there are learners who have not grasped this concept, work with them in a small group or individually to help them. Give the learners 10 sums to complete individually in their workbooks. Include examples done in the previous lesson, i.e. where the divisor does not go into the first digit of the dividend.

ASSESSMENT	**Informal:** You will be able to assess the learners' grasp of this concept and method from their participation in class and their written work.

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WEEK 6: Day 5

Notes to the teacher:

- In today's lesson, the learners will draw 3D objects.
- Learners often have difficulty drawing in perspective. This is made easier using dotted paper.
- Go through the process of each drawing step-by step. The learners will have a sense of accomplishment when they can draw a 3D object.
- Once they can draw these objects on dotted paper, let them draw the objects on plain paper.
- This lesson also provides the opportunity to revise the names of the 3D solids and their properties.
- 3D drawing integrates with Art.

Resources: Chalkboard, dotted paper, dotted paper with shapes to copy (see Addendum)

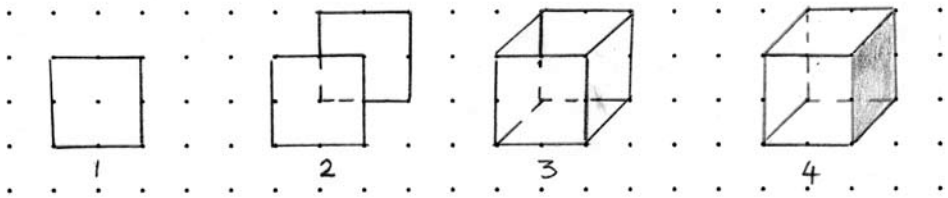
DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

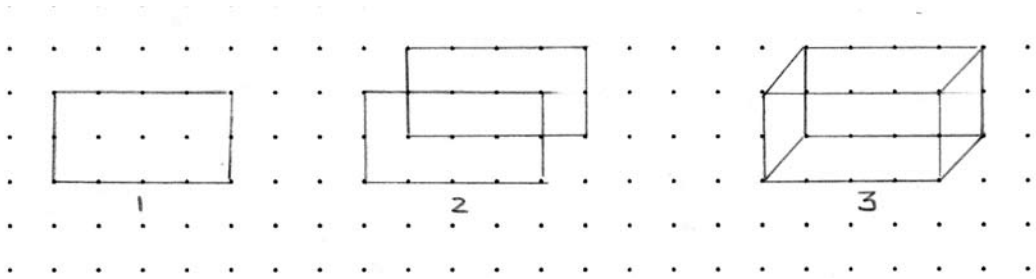
- Practise multiplication tables. Do a round of Tables King (see Addendum) and do some Clock Multiplication.

Concept Development (20 minutes)

- Ask the learners to tell you what a cube is. How many faces does it have? How many vertices? How many edges? Ask a learner or two to come and draw a cube on the board.
- Hand out the dotted paper, and show the learners how to draw a cube. Do this step by step with the learners copying you:



  - Step 1: Draw a square.
  - Step 2: Draw another square overlapping the first square you drew.
  - Step 3: Join the corners of each square to each other.
  - Step 4: Shade In one of the faces if you wish. The lines which would not be visible if it was a real cube can be erased in places to make dotted lines.
  - Let the learners draw another one from the beginning without you telling them what to do.
- Tell the learners to try to draw a rectangular prism, applying what they have learnt from drawing a cube. After they have had a chance to do this, go through the steps with them (or a learner who drew it correctly can come to the board to draw it and explain what he/she is doing):



- Repeat with other 3D objects in the Addendum. You can also add hexagonal or pentagonal prisms.

Consolidation (20 minutes)

- Give the learners another sheet of dotted paper. They can divide the page into 5 columns with the following headings. They must draw each object in the list and fill in its properties. Choose as many objects as you wish for them to draw:

Name of 3D object	Drawing	No. of faces	No. of edges	No. of vertices.
Cube				
Triangular prism				
Triangle based pyramid				
Rectangular prism				
Hexagonal prism				

Problem Solving (10 minutes)

- Learners can solve two to three problems using different operations. Write these on the board. Make sure the learners:
  - Write a number sentence
  - Estimate the answer
  - Do the calculation
  - Check the calculation
  - Write a complete answer.

ASSESSMENT	**Informal:** Mark the learners' work to see that they are able to draw 3D objects.

Grade 6: Week 7

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 7, 8 **LO 3 AS 7**	**Milestones:** • Solve problems involving comparing two or more quantities of the same kind (ratio) • 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) • Draw and interpret sketches of simple 3-dimensional objects from different positions.

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:	Drawing objects from different points of view	Addition and Subtraction of Mixed numbers	Addition and Subtraction of Mixed numbers	Ratio	Ratio
Resources	Chalkboard, textbooks, worksheets, everyday objects,	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.	Chalkboard, textbooks, worksheets.

WEEK 7: Day 1

Notes to the teacher:

- Continuing from the previous lesson where learners learnt to draw 3D objects, today the learners will draw every day objects from a different perspective (point of view).
- Often learners want to draw what they know is there, and not merely what they actually see.

Resources: Chalkboard, textbook, every day objects (tin can, pencil case, books)

DAILY ACTIVITIES

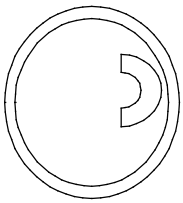
Oral and Mental Activity (10 minutes)

- Count in millions and 10 millions. Vary this by asking different groups to count, individuals to count, going backwards and forwards. Examples:
  - Count in 3 millions from 28 million…
  - Count backwards in 4 millions from 52 million
  - Count in 10 millions from 2 million
- Ask the learners 10 problems. They must write down the answers only in their workbooks. Examples:
  - There are 32 learners in the class. How many fingers and toes are there?
  - In the parking lot, there are 100 cars and 20 motorbikes. How many wheels?
  - I had R100. I bought a magazine for R29,75. How much change did I get?
  - How many 5-cent coins in R2?

Concept Development (15 minutes)

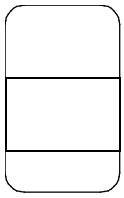
- Hold up a tin can for the learners to see. Ask them what shape it is (cylinder). Ask whether anybody can draw the bird's eye view (from the top – you will probably have to explain this term) of the can. Let one or two learners come and draw it on the board.

The learners should draw something similar to this:



  - Now ask them if anybody would like to draw on the board how they see the can from the front:

looks like this:

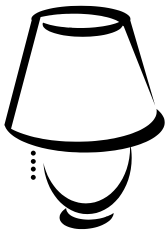
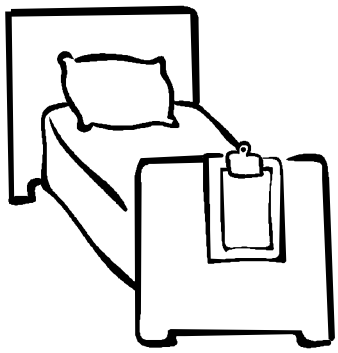


  - Explain that they are drawing objects from different perspectives. 3D objects look different when we look at them from a different position.
- Repeat with another object in the classroom, e.g. a chair or book. Different learners can come and draw the objects from different perspectives, i.e. from the top, the side, the front or the back.

- Let the learners work in pairs. They can choose an item in their desks or school bags and draw it from a certain perspective. They must then give the drawing to their partner, who must tell his/her friend from what perspective the item has been drawn.

Consolidation (20 minutes)

- Find exercises in the textbook for learners to complete. If you cannot, make a worksheet such as the following for the learners to complete, individually, in their workbooks.

	Bird's eye view	From the side	From the front	From the back
				
				

Revision (15 minutes)

- Learners can do some long division sums to help reinforce the concept. Give them about 6 sums to do. They can complete the work for homework.

ASSESSMENT	**Informal:** Check the learners' drawings to see if they understand the concept of drawing 3D objects from different perspectives.

WEEK 7: Day 2

Notes to the teacher:

- In today's lesson we will revise addition and subtraction of fractions and Mixed numbers.
- This concept was taught in the second term. It should not take too long for the learners to remember the concept, but often learners forget from one term to the next.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Revise multiples. Count on, going around the class. Count in multiples:
  - Of 4 from 28 to 72
  - Of 3 from 30 to 60
  - Of 7, backwards from 84 to 0
  - Of 6, from 42 to 84.
- In their workbooks, learners can write down, for example:
  - Multiples of 7 that are smaller than 100 but larger than 60;
  - Multiples of 12 from 48 to 144;
  - Multiples of 8 between 79 and 121. Give the learners about 8 like this.

Concept Development (20 minutes)

- Give the learners a problem, such as the following, to solve in their groups. *I had* $2\frac{5}{6}$ *litres of orange juice, and* $1\frac{3}{4}$ *litres of guava juice. How much juice did I have altogether?*
  - When most of the groups have finished, ask a learner in a group which got the correct answer to come to the board and explain, with your help to make the explanation clearer, how they obtained their answer.

$$2\frac{5}{6} + 1\frac{3}{4}$$
$$= 3 + \frac{10}{12} + \frac{9}{12}$$
$$= 3 + \frac{19}{12}$$
$$= 3 + 1\frac{7}{12}$$
$$= 4\frac{7}{12} \text{ litres of juice.}$$

Add the whole numbers.
Change the two fractions into fractions with the same denominator, in this case twelfths.
What one does to the numerator, one does to the denominator.
Make sure the learners do each step under the previous step.

Add the numerators only. Learners often want to add the denominators.

Change the Improper fraction to a Mixed Number. You might have to remind the learners how to do this.

- Give the learners another addition problem to solve. This time, the fractions can have denominators which are multiples of each other, e.g. $3\frac{3}{5}+4\frac{7}{15}$. In this case, the denominators will both be 15, so the second fraction will not change. After they have had enough time, go through the sum step by step as above.
- Give the learners a problem which entails subtraction of Mixed numbers. *It took us* $2\frac{3}{4}$

hours to get to the farm. Our friends took $1\frac{1}{2}$ *hours. How much longer did we take than our friends?*

- When most of the groups have finished, ask a learner in a group which got the correct answer to come to the board and explain how they obtained the answer. Help with the explanations to make sure that they are clear.

$2\frac{3}{4} - 1\frac{1}{2}$

Subtract the whole numbers. Change the fractions into fractions with the same denominator.

$= 1 + (\frac{3}{4} - \frac{2}{4})$

$= 1\frac{1}{4}$ hours.

Subtract the second numerator from the first numerator.

- Give the learners another problem to solve. They can work it out in their groups, then go through the steps with them afterwards.

Problem Solving (15 minutes)

- Find examples of problems which entail addition and subtraction of Mixed numbers in the textbook, or make a worksheet. If neither of these is possible, write some problems on the board. Make sure, when giving subtraction problems, that the numerator of the first fraction is larger than the numerator of the second fraction. Assist learners who are having difficulty with this concept.

Consolidation (15 minutes)

- Give the learners 3 addition and 3 subtraction of Mixed numbers sums to do individually in their workbooks. Make sure, in the subtraction sums, that the numerator of the first fraction is larger than the numerator of the second fraction.

ASSESSMENT	**Informal:** From observing the learners working in groups, and from their written work, you will be able to assess whether they can add and subtract Mixed numbers.

WEEK 7: Day 3

Notes to the teacher:

- In today's lesson, the focus will be on subtraction of Mixed numbers where the numerator of the first fraction is smaller than the numerator of the second fraction.
- This concept entails "borrowing" from the whole number. The whole number must be changed into a fraction with the same denominator as the two fractions being subtracted.
-

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Ask ten or fifteen questions orally to the class. The learners must write down the answers only in their workbooks. Afterwards, they can swop and mark each other's work. Concentrate mostly on fractions. Examples:

  - $\frac{1}{3}$ of 24 apples are bad. How many are bad?
  - How many eighths in $5\frac{1}{8}$?
  - Which is greater: $\frac{1}{4}$ or $\frac{1}{5}$?
  - What is the next number: $\frac{5}{8}$; 1; $1\frac{3}{8}$; ….
  - How many quarters in 1 whole?

Concept Development (20 minutes)

- Do a subtraction of Mixed numbers sum on the board. Involve the learners by asking them what to do next, how to make equivalent fractions, etc.

$$3\frac{3}{8} - 1\frac{7}{16}$$

$$= 2 + (\frac{6}{16} - \frac{7}{16})$$

$$1 + \frac{16}{16}$$

$$= 1 + (\frac{16}{16} + \frac{6}{16}) - \frac{7}{16}$$

$$= 1 + (\frac{22}{16} - \frac{7}{16})$$

$$= 1\frac{15}{16}$$

Subtract the whole numbers. Change the fractions into fractions with the same denominator.

We cannot take numerator 7 from numerator 6. We change one whole into a fraction with denominator 16, as we are working in sixteenths. The brackets are only to show our thinking, which numerators to add together.

- Do another example on the board. Ensure that the learners are participating and paying attention by asking them questions all the time.
- Give the learners a subtraction sum to do in their groups or in pairs. Afterwards, go through it step by step. Make sure they understand the concept of changing the whole number to a fraction when they have to subtract a larger fraction from a smaller fraction.

Consolidation (15 minutes)

- Learners who have grasped this concept can do 5 or 6 sums in their workbooks. While they are busy, help learners in small groups who have not fully grasped this concept. You will find sums in their textbooks. If not, make a worksheet or write sums on the board. You can include subtraction without borrowing, and addition sums.

Problem Solving (15 minutes)

- Find problems which entail addition and subtraction of Mixed numbers in the textbook. Learners should be able to complete 5 or more such problems. They can finish them for homework. If you cannot find suitable problems, make a worksheet or write problems on the board.

ASSESSMENT	**Informal:** Mark the learners' class work to ensure that they understand addition and subtraction of Mixed numbers, and, especially the new concept, subtraction when it is necessary to convert a whole number to a fraction with equal numerator and denominator.

WEEK 7: Day 4

Notes to the teacher:

- Today's lesson will introduce the learners to the concept of Ratio.
- Ratio is a statement of how two parts of a mix compare. The mix could include different people (boys, girls), different colours of paints in a mixture (blue and white), etc.
- The learners might have seen Dilute1:3 on an orange juice concentrate label. This means that for every part of orange juice you pour, you add 3 parts of water. The ratio of water to orange concentrate is 3:1.
- Ratio is written with a colon between the two (or more) numbers being compared. If the ratio is written 1:4, we say "One *to* four".
- In ratio, we can multiply each number being compared by the same number, and the ratio remains the same. For example. 1:2 is the same ratio as 3:6.
- We write ratio in its simplest form.
- We do not write labels (e.g. cm, girls, litres) in ratio. We say the ratio of red paint to blue paint is 3:2, irrespective of whether it is in litres, millilitres. The comparison stays the same.
- If we add the two numbers being compared in ratio, we obtain the total number of parts. If the ratio of girls to boys is 2:3, this means that there are 2 girls to every 3 boys, and the total number of children in a group is 5. The fraction of girls in that group would be $^{2}/_{5}$ and the boys $^{3}/_{5}$.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners some multiplying by doubling and halving. Give an example or two, such as:
  - 32x50. 50 is half of 100. Multiply 32x100=3 200, then halve 3 200=1 600.
  - 17x20. Think: 17x10x2=170x2=340
- Do 4 or 5 orally, asking the whole class then choosing learners who have their hands up first with the answer. Afterwards, give the learners ten calculations to do in their workbooks. When they have finished, the learners can swop books and mark each other's work.

Concept Development (25 minutes)

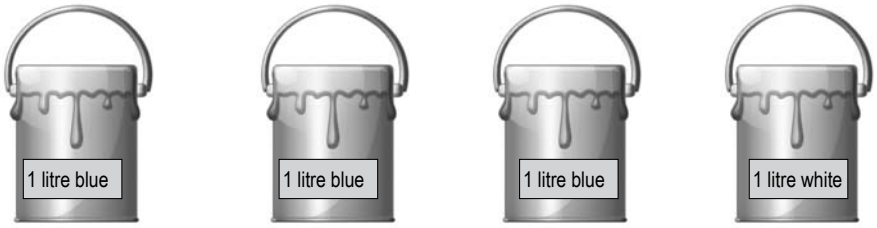
- Write this on the board **Dilute 1:3** and then ask the learners if they have ever seen something like that and do they know what it means.
  - The learners might be able to tell you that we see this on a bottle of orange (or other) juice concentrate. Ask them what the word dilute means. It means to lessen the strength of a liquid by adding water. In the above example, which number refers to the juice concentrate? The 1. If we pour one part of juice concentrate, how many parts of water must we add? 3. How many parts do we have altogether? 4.
  - Tell the learners we are comparing two parts of a mixture. Ask if anybody knows what we call it when we compare two quantities like this? It is called ratio. Repeat the word a few times.
  - Point out how we write ratio, with a colon between the numbers. Ask the learners if anyone knows how we say this? We say "One *to* three".
- Choose 2 girls and 3 boys to come and stand at the front of the classroom. Ask a learner to come to the board and write the ratio of girls to boys. They must write 2:3. Ask them to say the ratio "Two to Three."

- Ask another learner to come to the board and write the ratio of boys to girls. They must write 3:2. They must say "Three to two".
- Ask the learners why we wrote the above two ratios differently? It is because we always write the numbers in the same order as the quantities being compared.
- Girls:Boys = 2:3. Boys:Girls = 3:2

Emphasise this point.

- Ask the class how many learners are at the front of the class? There are 5. What fraction of the learners are the girls? $\frac{2}{5}$. What fraction of the learners are the boys? $\frac{3}{5}$.
- Repeat the above several times, choosing different numbers of boys and girls (and different learners).

• Tell the learners that you want to paint your house. You need to mix the paint. You have bought the following quantities of paint to mix (draw the tins on the board):



- Ask the learners what the ratio of blue paint is to white paint? A learner can write it on the board. Make the learners say "Three to one". Point out to the learners that we do *not* write litres (or any other unit of measurement) in ratio. We write 3:1
- Ask the learners what the ratio of white paint is to blue paint? A learner can write it on the board. Make the learners say "One to three".
- Ask the learners how much paint you have altogether? What fraction is the blue paint of the whole quantity of paint? What fraction is the white paint of the whole quantity of paint?
- Tell the learners that when you tried the mixed paint, you found it was too dark, you wanted it lighter. What colour should you add to make it lighter?
- Tell the learners that the above quantities were only enough to paint half your house. How much more of each colour paint must you buy to paint your entire house?

• Draw a rectangle on the board. Along the length of the rectangle write 5m, and along the width of the rectangle write 3m. Ask the learners what the ratio of the length of the rectangle is to the breadth. It is 5:3. Point out that we do not write metres in the ratio.

Problem Solving (25 minutes)

• If there are no suitable examples in textbooks, make a worksheet or write work on the board to enable learners to practise what has been learnt today. They must work individually, in their workbooks, to complete the work. If there are any learners who are still unsure of this concept, help them in a small group. Examples:

- There are 5 cars stopped at the traffic light. Three of the cars are white, the rest are different colours. What is the ratio of: (a) white to coloured cars; (b) coloured cars to white cars? What fraction of the cars are the white cars? - Mandy likes to eat peanut butter and syrup on her bread. She spreads 1 teaspoon of peanut butter and 3 teaspoons of syrup onto a slice of bread. What is the ratio of peanut butter to syrup? What is the ratio of syrup to peanut butter? If she spreads peanut butter and syrup on three slices of bread in the same ratio, how many teaspoons of peanut butter and syrup will she use? - In a group of 8 people, 5 are teachers and the rest are policemen. What is the ratio of teachers to policemen? What is the ratio of policemen to teachers? - If I mix red and white paint, I will get pink paint. For my bedroom, I mixed red and white in the ratio 1:3. For the kitchen, I mixed red and white in the ratio 3:1. Which room will be a darker colour pink? - A rectangle has a length of 7 cm. The ratio of its length to its width is 7:3. Draw this rectangle accurately.	
ASSESSMENT	**Informal:** Assess your learners' class work to see if they understand the concept or ratio.

WEEK 7: Day 5

Notes to the teacher:
- Today's lesson continues with the concept of ratio.
- The focus will be on writing ratio in its simplest form and on finding quantities of a whole number by using ratio. These two concepts are the same as when working with fractions.

Resources: Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)
- Do some "Running Maths" (see Addendum: Mental Strategies).
- Give the learners ten or fifteen calculations to do in their heads. Say the sums, the learners must write down the answers only in their workbooks. Afterwards, they can swop books and mark each other's work. Examples:
  - 235+□=1 000
  - Double 356
  - 12x12-40=
  - (7x8)+(4x11)=
  - 5+7+9+11=
  - Halve 628

Concept Development (20 minutes)
- The learners can work in their groups to try to solve a problem such as the following: *The shopkeeper paid two people R400 to help him for a few hours. The two people, Michael and Joshua, worked for different numbers of hours in the ratio 1:3. How much money should they each receive?*
  - Walk around and watch what the groups are doing. Let a group who obtained the correct answer explain to the class what they did. Help with the explanation to make sure it is clear and correct.
  - Firstly, add 1+3=4 to find out how many parts there are in total.
  - Write each boy's part as a fraction of the whole. Michael received $\frac{1}{4}$ of the money, Joshua received $\frac{3}{4}$ of the money.
  - $\frac{1}{4}$ of R400 = R400÷4=R100 for Michael.
  - $\frac{3}{4}$ of R400 = R400÷4x3=R300. (OR R400-R100 [Michael's share]).
  - Do another two or three similar examples with the learners.
- Explain to the learners that, as with fractions, we always write ratio in it simplest form. Give them an example: *There are 48 girls and 60 boys in the grade. What is the ratio of girls to boys?* See if anyone knows what to do to write this ratio in its simplest form.
  - We can write 48:60. This, in its simplest form, is 4:5. So, the ratio of girls to boys in the grade is 4:5. For every 4 girls, there are 5 boys.
  - Do another two to three examples with the learners.

Consolidation (15 minutes)

- Give the learners about ten ratios to write in their simplest form. They must work individually, in their workbooks. Help learners who are having difficulty with this concept.
- Give the learners ten calculations involving dividing a whole number in a given ratio. Examples:
  - Divide 25 sweets in the ratio 1:4
  - Divide R810 in the ratio 8:1

We divide each number by the same number (a common factor), until we can divide no further. This is the same concept as simplifying fractions.

Problem Solving (15 minutes)

- If you cannot find suitable problems in the textbook, make a worksheet or write problems such as the following on the board. Give the learners about 8 problems to solve.
  - There were 3 200 spectators at a football match. 2 000 were men and the rest were women and children. Write the ratio of men to women and children in its simplest form.
  - When we went on holiday, my mother and father drove in the ratio of 2:5. If the total distance of our journey was 840 km, how far did my mother drive?
  - I have 2 800 ml of orange juice. It was mixed in the ratio 1:3. How much of the mixture is water?
  - On my lawn one morning, there were 28 sparrows and 35 doves. What was the ratio of sparrows to doves?
  - My lawnmower has oil added into the petrol in the ratio 1:7. If I bought 14 litres of petrol, how much oil must I add?
  - My mother makes soup for the soup kitchen. She used 18 kg of potatoes and 24 kg of other vegetables in the soup. Write this ratio in its simplest form. If she made 49 litres of soup, how many kg of potatoes did she use? (The ratio must be written in its simplest form to be able to solve this problem)

ASSESSMENT	**Informal:** Assess from the learners' participation in class, their oral responses and their written work whether they have grasped the concept taught today.

Grade 6: Week 8

Hours: 5	**Number of Periods: 5**
Mathematics LO 1 AS 4, 8, 10 **LO 2 AS 4** **LO 4 AS 5** **LO 5 AS 4, 5, 6**	**Milestones:** • Recognise the place value of digits in decimal fractions to at least 2 decimal places • Use a range of techniques to perform written calculations with whole numbers including adding and subtracting in columns • Estimate and calculate by selecting and using operations appropriate to solve problems that involve division of at least 4-digit by 2-digit numbers. • Write number sentences to describe a problem situation within a context. • Solve problems involving selecting, calculating with and converting between appropriate SI units (measurement) • Organise and record data using tallies and tables. • Examine ungrouped numerical data to determine mode and median. • Draw graphs and interpret data including pictographs with many-to-one correspondence and appropriate keys.

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:	Division 4-digit by 2-digit numbers	Revise place value of 2-digit decimals. Start Data Handling project.	Revise addition and subtraction in columns. Problem solving involving 4 operations	Problem solving including SI units. Integrate with NS and Technology	Complete Data Handling project in class
Resources	Chalkboard, textbook, worksheets.	Chalkboard, textbook, worksheets. Prepared Data Handling project.	Chalkboard, textbook, worksheets.	Chalkboard, textbook, worksheets. Prepared Assessment task (Mental calculations)	Chalkboard, textbook, worksheets.

WEEK 8: Day 1

Notes to the teacher:

- The focus of today's lesson will be on dividing 4-digit by 2-digit numbers.
- Some time has been spent recently on the concept of Long Division. Do not expect learners to be able to use this method when dividing 4-digit by 2-digit numbers. They can use repeated subtraction, a method they have been using for a long time and are familiar with. However, they must be encouraged to subtract as large a number as possible each time.
- Division is the inverse (opposite) of multiplication, so learners should be encouraged to check their answers by multiplication. This will also give them additional practice in multiplying in columns.
- Whatever method of division the learners use, it is always advisable to write down some multiples of the divisor (doubling, re-doubling, halving etc) on a "Clue board".

Resources: Textbooks, chalkboard, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Count around the class in decimals. Each learner can continue after the previous learner. Before you start, establish in which direction you will count around the class. Count the first three numbers, then let the learners continue until you say stop. Start another pattern by counting another three numbers. Examples:
  - You say 1; 0,98; 0,96 ….. the learners continue
  - You say 5,12; 5,07, 5,02; … the learners continue

Concept Development (20 minutes)

- Give the learners a problem such as the following to solve in pairs: *The farmer has 8 736 eggs. He has to put them in boxes of 2 dozen to take to the supermarket. How many boxes does he need?*

  A dozen = 12. Use this word sometimes.
  - Watch the learners as they work this out. Guide the learners who have not decided on the correct operation to use. Afterwards, discuss their method.
  - First, do a clue board. This is good practice in doubling and halving and enables the learners to see quickly which the largest number is. They must always try to subtract as large a number as possible.
  - Let a pair of learners who got the correct answer come and do the calculation on the board. Ask other learners in the class what the learners working on the board are doing, and why. Ensure that all learners are participating by asking questions.
  - The learners will have done something like this (numbers may vary):

8 736-**7 200**=1 536	24x**300**
1 536-**1 200**= 336	24x**50**
336-**240**=96	24x**10**
96-**96**=0	24x**4**
	300+50+10+4=364

CLUE BOARD
24x10=240
24x5=120 (halve above)
24x20=480 (double 24x10)
24x40=960 (double above)
24x100=2 400
24x50=1 200 (halve above)
24x200=4 800
24x300=7 200 (add above 2 numbers)

  - He needed <u>364 boxes</u> (Write a complete answer).
  - Ask the learners how we can check? We can multiply the answer by the divisor: If our answer is the same as the original number being divided into (the dividend, eggs in this case), our answer is correct.

	3	6	4
		2	4
1	4	5	6
7	2	8	0
8	7	3	6

A learner who is good at multiplication can do this checking sum on the board.

- Do one or two more similar examples, following the steps above, with other 4-digit and 2-digit numbers.

Problem Solving (15 minutes)

- If there are still learners having difficulty with this concept, help them in a small group while the rest of the learners solve problems entailing division of a 4-digit by a 2-digit number, individually in their workbooks.
  - These problems do take quite a long time, so do not give the learners more than 2 or 3 to solve.
  - Learners must write a number sentence.
  - They must check by multiplying.
  - Their answers must be complete.

Consolidation (15 minutes)

- Give the learners 3 division sums to complete in their workbooks. They can complete the work for homework. Walk around while they are busy and check that they are subtracting by as large a number as possible each time. They must do a multiplication sum each time to check their answers.

ASSESSMENT	**Informal:** Assess the learners' class work to see if they understand this concept.

WEEK 8: Day 2

Notes to the teacher:

- In today's lesson, we will revise place value in decimal fractions to 2 decimal places.
- This was taught in the third week of this term. However, it is always advisable to return to previously taught concepts.
- The decimal comma separates the whole numbers, on the left of the comma, from the decimal fractions to the right of the comma.
- Learners are going to do an assignment (project) on Data Handling. Instructions of what are required are in the Addendum. These instructions need to be given to and discussed with the learners. They must do some of the questioning within their community within the next three days. The Assignment will be completed in class in three days' time.

Resources: Prepared Data handling Assignment (see Addendum); Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some Running Maths (see Addendum Mental Strategies). Include all four operations and doubling, halving.
- Give the learners 15 sums to calculate mentally. Write the sums on the board. The learners can write down the answers only. Afterwards, they can swop books and mark each other's work. Include all four operations, doubling, halving and mixed operations. Examples:

  - $48+\frac{1}{4}$ of 28
  - 12x11x0+10
  - 101-89
  - 18+56+22+44

Concept Development (20 minutes)

- If you cannot hand out a photocopied copy of assignment instructions, write them clearly on the board for the learners to copy. Go through these with the learners, making sure they understand what is required of them and the deadlines involved.
- Revise place value in decimal fractions up to two digits. Write a number such as the following on the board: 5 689,32. Ask different learners in turn to read the number to you. Ask questions such as: What does the comma mean? Which digits have a value of less than a whole? What is the place value of the 8? What is the place value of the 3? Which digit has the least value? How do we write the 3 as a common fraction? ($\frac{3}{10}$) How do we write the 2 as a common fraction? Ask one or two learners to write the number in expanded notation.
- Write a number in expanded notation and ask 4 or 5 learners to come and write the number formed. Give each learner their own work space on the board by drawing columns on the lower part of the board. For example, write:

  (2x1 000)+(7x10 000)+(6x$\frac{1}{10}$)+(2x10)+(5x100)+(Lx$\frac{4}{100}$). The learners must write: 72 520,14.

Consolidation (20 minutes)

- Learners can work individually, in their workbooks, to do examples from the textbook (or a worksheet, or from the chalkboard if there are no suitable examples in the textbook) to practise recognising place value in decimals with 2 decimal places. Examples should include several of each of the following:
  - Writing numbers with 2 decimal places in expanded notation
  - Forming decimal numbers from expanded numbers
  - Arranging five numbers in ascending order, e.g. 12,12; 12,21; 12,02; 12,2; 12,01
  - Comparing decimals by filling in $\langle$, $\rangle$ or =
  - Writing a decimal fraction that is e.g. 5 hundredths more than 428,21
  - Writing a decimal fraction that is e.g. 2 tenths smaller than 55,68

Assignment (10 minutes)

- Learners can start working on their assignment. They can think of what they are going to ask in their questionnaires and check with you whether their topics are suitable and the categories realistic and relevant.

ASSESSMENT	**Informal:** The learners' written work will enable you to assess whether they understand place value in decimal fractions to two decimal places.

WEEK 8: Day 3

Notes to the teacher:

- Use today's lesson to revise the four operations in the context of problem solving. This will give you the opportunity to clarify areas of weakness and remedy these areas before the learners complete their assessment task in a few days' time.
- Often learners are able to solve addition problems when you have been doing addition, subtraction problems when you have been doing subtraction, etc. However, it is important to give a variety of problems entailing different operations as often as possible to ensure that learners know which operation to use.
- Learners must always check their answers by asking, "Is this a reasonable answer (does it make sense)?" They must also check by using the inverse operation where possible. If it can be carefully monitored and controlled, the learners can check using their calculators. They must not use their calculators while working solving the problems.

Resources: Chalkboard, textbook, worksheets. Calculators

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Play "Zap" on calculators. (See Addendum Mental Strategies for instructions). Let the learners play this in pairs, each learner having one turn. They must use seven different digits to create a 5-digit whole number and a 2-digit decimal number.
- Practise multiplication tables. Concentrate on a table such as 7x. Do Clock multiplication (see Addendum Mental Strategies) and ask learners randomly around the class. Include 7x0. Also ask in two different ways, e.g. 7x12 or 12x7.

Revision (20 minutes)

- Write a calculation such as the following on the board: 452+1 897+23+45 218. Create workspace for 4 or 5 learners by making columns on the bottom half of the board. Choose 4 or 5 learners to come and do the calculation on the board. Afterwards, check their answers. If any of the learners got the sum wrong, see if another learner can find the mistake. Check:
  - The learners add in columns.
  - The digits are lined up in columns, starting with the units.
  - The learners add, starting with the units column and working to the left.
  - The learners carry over correctly.
  - Check by adding in the opposite direction.
- Repeat with subtraction, giving 4 or 5 different learners a turn to do the calculation on the board. Example: Find the difference between 23 451 and 15 673. Check:
  - The learners subtract in columns.
  - The digits are lined up in columns, starting with the units
  - The learners subtract, starting with the units column and working to the left
  - The learners borrow correctly and do not merely subtract the smaller digit from the larger digit.
  - The learners check by adding.
- Repeat with multiplication. Write a 4-digit number to be multiplied by a 2-digit number on the board. Give different learners an opportunity to do the calculation on the board. Check:
  - The digits are lined up in columns, starting with the units
  - The larger number is written on top

- Each digit in the top row is multiplied by each digit in the bottom row.
- When multiplying by the digit with a place value of Tens, the learners write down a 0.
- Carrying over is done correctly. Learners must multiply before adding the carried over number.

• If you feel it necessary, do a division calculation in the same way. However, division was taught only a couple of days ago.

Problem Solving (30 minutes)

• Give the learners 8 problems to solve, individually in their workbooks. If you cannot find suitable problems in their textbooks, make a worksheet or write problems on the board. While they are working walk around and check their work. Help any learners who are having difficulty with any particular problem. For each problem, they must:
  - Write a number sentence.
  - Do the calculation (in columns for addition, subtraction and multiplication)
  - Check their answers: Check addition by adding the digits in a different order from the first time. Check subtraction by adding. Check multiplication by multiplying again, but by changing the order of the digits being multiplied (i.e. instead of 5x7, check by multiplying 7x5). Check division by multiplying the quotient (answer) by the divisor to obtain the dividend (number being divided into).
  - Make sure their answers are complete.

ASSESSMENT	**Informal:** Check which operation/s learners are having difficulty with by observing them while they work and marking their written work.

WEEK 8: Day 4

Notes to the teacher:

- Further revision and practice in problem solving is the focus of today's lesson.
- From your observations of your learners' work in yesterday's revision, you should know what to specifically focus on today. Problem solving using conversion between the different SI units (Measurement) also needs to be revised. This conept integrates with NS and Technology.
- Spend some time revising Addition and Subtraction of Mixed numbers
- During this and the next lesson, learners' ability to perform mental calculations involving addition, subtraction and multiplication of whole numbers must be assessed for Assessment Task 2.

Resources: Chalkboard, textbooks, worksheets. Prepared revision quiz questions (SI units).Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 20 mental calculations to complete. Ask the first ten orally, and the next ten you can write on the board. The learners must write down the answers only in their workbooks. Include addition, subtraction and multiplication up to 12x12. Include multiplication by 0. Use vocabulary such as product, sum, and difference.

Revision (25 minutes)

- Divide the class into two groups to have a revision quiz. Ask each group in turn questions which entail knowing how to convert between SI units, which SI units to use for which measurement, etc. Keep score and give the winning group a reward (extra break perhaps). Examples:
  - What is the greatest unit of measurement of length?
  - What unit of length is 10 times smaller than a centimetre?
  - What unit do we use to measure degrees Celsius?
  - I have an item with a mass of 456 g. How much less than a kilogram is this?
  - How many litres and millilitres in 3 452 millilitres?
  - What do we use millilitres to measure?
  - How many millilitres of water equal a gram?

- Write a sum such as the following on the board. $4\frac{3}{4} + 3\frac{5}{8}$. Divide the board into 4 or 5 sections to give working space for 4 or 5 learners to do the calculation. Afterwards, check their answers. If any of the learners got the sum wrong, see if another learner can find the mistake. Check:
  - Whole numbers are added first.
  - Each fraction is converted to a fraction with the same denominator, in this case eighths.
  - Any improper fraction is converted to a mixed number. The whole number part of that mixed number must be added to the whole number, 7, obtained by adding, 4+3, above.
  - Answer must be in its simplest form.
- Repeat the above with a subtraction sum. Give other learners a chance to do the calculation. Check:

- Whole numbers are subtracted from each other.
- Fractions are converted to fractions with the same denominators.
- If the numerator of the fraction being subtracted is larger than the numerator of the first fraction, a whole number must be: reduced by 1, the 1 converted to a fraction, and that fraction must be added to the first fraction. (See Week 7 Day 3)

Problem Solving (25 minutes)

- Give the learners six to 8 problems entailing addition and subtraction of whole numbers and fractions, converting and calculation different SI units. You can also include problems that entail addition, subtraction and multiplication in columns. Make sure the problems are random. For each problem, learners must:
  - Write a number sentence.
  - Do the calculation (in columns for addition, subtraction and multiplication)
  - Check their answers
  - Make sure their answers are complete.

ASSESSMENT	**Informal:** Check the learners' work to see that they are able to solve problems entailing different concepts.
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 9a: Perform mental calculations involving addition and subtraction 9b: Perform mental calculations involving multiplication to at least 12x12

WEEK 8: Day 5

Notes to the teacher:

- In today's lesson, learners will complete their Data Handling assignment which was given to them three days ago.
- They should have compiled their questionnaires, asked the required number of people the questions and recorded the results.
- Today, they must ensure their questionnaires and tally charts are neat. They must also draw their pictographs.
- Spend some time in this lesson revising median and mode.
- During this lesson, learners' ability to perform mental calculations involving addition, subtraction and multiplication of whole numbers must be assessed for Assessment Task 2. Use the mark they obtain together with their mark from the previous task.

Resources: Prepared Assessment Task (mental calculations), chalkboard.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners 20 mental calculations to complete. Ask the first ten orally, and the next ten you can write on the board. The learners must write down the answers only in their workbooks. Include addition, subtraction and multiplication up to 12x12. Include multiplication by 0. Use vocabulary such as product, sum, and difference.

Revision (20 minutes)

- Ask learners, individually, to say their favourite number between 0 and 15. They can say the first number that comes into their head; it is fine if it has already been said by another learner. As they say the number, write it on the board:

5	13	14	12	5	7	9
1	5	3	5	7	9	12
13	14	11	10	9	11	13

- Tell the learners you want to find the median of this data. See which learners can tell you how to do this. Listen to a few ideas, until someone has the correct method (this might be the first learner you ask).
- Get a learner to come to the board and write the numbers from smallest to largest:
  1 3 5 5 5 5 7 7 9 9 <u>9</u> 10 11 11 12 12 13 13 13 14 14
  There are 21 numbers in this range. The middle number (ten numbers each side) is 9. Remind the learners that median has a d, just like middle has a d.
- Ask the learners if anyone can tell you the mode of this data (**mo**de = **mo**st frequently occurring number. In this range, the mode is 5, as this number appears the most.

Assignment (30 minutes)

- Learners must work on and complete their Data Handling assignment. Everything must be neat and well presented. See Notes to the teacher, above.

ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 9a: Perform mental calculations involving addition and subtraction 9b: Perform mental calculations involving multiplication to at least 12x12 • LO 5 AS 4: Organise and record data using tallies and tables. AS 6a: Draw pictographs with many-to-one correspondence and appropriate keys.

Grade 6: Week 9

Hours: 5	**Number of Periods: 5**
Mathematics LO 4 AS 3	**Milestones:** • Describe and illustrate ways of measuring in different cultures throughout history, including informal measuring systems.

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:	Revise Long Division and Ratio	Assessment Task 2	Assessment Task 2	History of measurement	History of Measurement
Resources	Chalkboard, textbook, worksheets.	Prepared Assessment Task	Prepared Assessment Task	Information (see Addendum)	Information (see Addendum)

WEEK 9: Day 1

Notes to the teacher:

- Use this lesson to revise Long Division and Ratio.
- After going through the concepts, learners will again do a lot of problem solving. Include problems that entail previously revised concepts.

Resources: Chalkboard, textbooks, revision worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Draw the following Maths square on the board. Learners must copy it down and fill in the missing numbers 0-9 so that each row adds up to the total to the right of it, each column adds up to the total below it, and each diagonal adds up to the totals in the corners. The solution is here for your convenience. Do not show it to the learners.

				10
		2		15
2		5		7
		8	2	13
			8	27
12	12	24	14	22

Solution:

				10
6	3	2	4	15
2	0	5	0	7
3	0	8	2	13
1	9	9	8	27
12	12	24	14	22

- If the learners complete the above and you have some time, do a round of Tables King (see Addendum Mental Strategies).

Revision (20 minutes)

- Give learners in pairs a division sum to do. They must use long division. As they work, go around and check that they are doing the sum correctly. Remind them of the "Division family" (DMSB= Divide, Multiply, subtract, bring down). Afterward, let two different learners come and do the sum on the board. Other learners can check on their method.
- If not enough learners in pairs were doing Long Division correctly, go through the method again with them. (Refer to Week 6, Days 3 and 4). If only a few learners are not sure of what to do, work with them in a small group when the rest of the class is doing written work later in the lesson.
- Tell the learners: *I made a milkshake which had 200 ml of ice-cream and 500 ml of milk.* Ask the following questions, discussing each answer with the learners: *What is the total amount of milkshake I made? What is the ratio of ice-cream to milk in its simplest form? What is the ratio of the milk to ice-cream in its lowest form? What fraction of the milkshake is the ice-cream? My friend also wanted a milkshake, so I used 400 ml of ice-cream. How much milk did I need to add?*
- If the learners do not seem to understand Ratio, explain the concept to them again and work through examples with them. (Refer Week 7 Day 4 and 5)

Problem Solving (15 minutes)

- Give the learners a few problems entailing ratio to solve. If you cannot find examples in the textbook, make a worksheet or write problems on the board. If there are some learners who are unsure of ratio, work with them in small groups.
- If you feel there are any other concepts which need more practice in problem solving context, give the learners problems to complete. Make sure that when the learners do problems, they:
  - Write a number sentence
  - Estimate the answer by rounding off
  - Do the calculation (in columns for addition, subtraction and multiplication)
  - Check their answers
  - Write a complete answer.

Consolidation (15 minutes)

- The learners can complete about 4 Long Division calculations, individually in their workbooks. Help learners who are still struggling with this method of division.

ASSESSMENT	**Informal:** From walking around the class while the learners are working, you will be able to assess whether they understand ratio and long division.

WEEK 9: Day 2	
Notes to the teacher: • In today's lesson, formal assessment will take place. Today, the learners' ability to do various calculations and to recognise place value will be assessed. In the next lesson, their problem-solving ability will be assessed. • The learners must unaided and quietly to complete the Assessment Task. **Resources:** Prepared Assessment Task. Refer to the Rating Scale, page 24 "Foundations for Learning Assessments Framework Intermediate Phase" for the requirements.	
DAILY ACTIVITIES	
Oral and Mental Activity (10 minutes) • Do some "Running Maths" (see Addendum Mental Strategies) • Give the learners 10 to 15 multiplication, addition and subtraction sums. Say the sums and the learners must write down the answers. Afterwards, they can swop books and mark each other's work. **Assessment Task** (50 minutes) • The learners must be assessed on their ability to: - Use expanded notation to indicate the place value of 8-digit numbers. - Indicate the place value of decimal fractions to at least 2 decimal places. - Add 8-digit numbers in columns - Subtract 8-digit numbers in columns. - Multiply 3-digit by 2-digit numbers using columns. - Correctly calculate using Long Division (to the level taught so far)	
ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 4: Recognise the place value of digits in whole numbers to a minimum of 8-digit numbers • LO 1 AS 4: Indicate the place value of decimal fractions to at least 2 decimal places • LO 1 AS 10: Add, subtract and multiply in columns. • LO 1 AS 10: Perform calculations with whole numbers including long division.

WEEK 9: Day 3

Notes to the teacher:

- In today's lesson, learners will be assessed on the concepts, not yet assessed, for Assessment Task.
- In the previous lesson, learners were assessed on their calculation skills, using different operations. Today's Assessment Task will be in the format of problem solving.

Resources: Prepared Assessment Task.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round of "Tables Challenge" (see Addendum Mental Strategies for instructions). You can include doubling, halving, adding and subtraction.

Assessment Task (50 minutes)

- Learners must work individually, unaided and in silence to complete the Assessment Task. This Assessment Task must comprise:
  - Problem solving using addition of mixed numbers.
  - Problem solving using subtraction of mixed numbers
  - Problem solving involving multiplication of 4-digit by 2-digit numbers.
  - Problem solving involving division of 4-digit by 2-digit numbers.
  - Writing number sentences to describe a problem situation within a context.
  - Interpret sketches of 3-dimensional objects from different positions.

ASSESSMENT	**Formal, recorded Assessment Task :** • LO 1 AS 8: Solve problems that involve addition and subtraction of mixed numbers. • LO 1 AS 8: Solve problems that involve multiplication of 4-digit by 2-digit numbers • LO 1 AS 8: Solve problems that involve division of a 4-digit number by a 2-digit number. • LO 2 AS 4: Write number sentences to describe a problem situation within a context. • LO 3 AS 7: Draw and interpret sketches of simple 3-dimensional objects from different positions.

WEEK 9: Day 4

Notes to the teacher:

- Now that the formal assessment tasks for the third term have been completed, you can focus on milestones that do not need to be assessed.
- Do not lose momentum as the end of the term approaches. The work to be done is important.
- The focus of the next few lessons will be on the History of Measurement. This is an ideal opportunity for the learners to do a project in groups.
- Every day, continue with mental activities and do some problem solving. If learners are given time to work on their projects without some focus, they might think they are being given free time and things could become chaotic. Therefore, monitor their progress carefully, and guide them with suggestions.

Resources: Information on the History of Measurement (see Addendum). Try to find additional information from books in the library.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Learners can do some adding by compensating. Give few examples, such as: 234+98= 234+100-2=332. Write 15 sums on the board to give learners practice in adding 19, 99, 98 and 97.

Group work explanation (20 minutes)

- Divide the learners into groups and hand out the information on the History of Measurement (have enough copies for each group).
  - Read through the information with the learners. Try to make them understand the chaos that there must have been with different units of measurement, and how easy the metric system that we use is. Try to instill some interest and enthusiasm in the learners. You will do this by being interested and enthusiastic yourself, and by trying to get the learners to use their imaginations.
  - Explain to the learners that they are going to do a group project about the History of Measurement. Explain exactly what they have to do. Write the instructions on the board. It is up to you what they do; there are ideas in the Addendum, History of Measurement Project. You could combine ideas, or have better ideas yourself.
  - Establish a time frame. Give the learners at least 30 minutes of class time over the next few days. Three such sessions should be more than enough. The learners can do some work on this at home.
  - Make sure all the learners understand what is required of them.

Group work (15 minutes)

- Learners can discuss their ideas and decide who is going to do what part of the project. If anything needs to be purchased by the learners (depending on their circumstances), they must decide who will purchase what.
- If you decided to give them a different activity each day, based on the information (as suggested in the Addendum), let the learners read through the information again.

Problem solving (15 minutes) • Give the learners four or five problems to solve involving finding fractions of a whole number. For example: - There are 448 learners in Grades 6 and 7. $\frac{5}{8}$ of these are boys. How many girls are there?	
ASSESSMENT	**Informal:** You can assess the learners' abilities to work as a member of a group.

WEEK 9: Day 5

Notes to the teacher:

- Today, the learners will be given 30 minutes to continue with the group work on the History of Measurement.
- Monitor their progress carefully, making sure they are actively involved within their groups. If you see somebody is not working or contributing, assist the group to make sure there is a task for everyone (drawing pictures etc.)
- Some time will again be spent on problem solving. It is important to constantly re-visit concepts taught earlier in the year.

Resources: Information on the History of Measurement (see Addendum). Try to find additional information from books in the library.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners a table such as the following to complete to revise rounding off. You can write the table on the board, the learners can write down the answers only:

Number:	Round off to nearest 10	Round off to nearest 100	Round off to nearest 1 000
58 948			
12 999			
168 592			
1 857			
68 923			

Group work (30 minutes)

- Learners can work on their projects. Make sure everyone is busy. If you chose to give the learners a different activity (questions to answer, crossword puzzle etc as per the ideas in the Addendum), give them one of these activities now to complete in their groups.

Problem Solving (20 minutes)

- Budgets and Profit and Loss was taught in Term 2. Give the learners some problems to solve entailing these concepts and using the vocabulary involved. They can use their calculators, but must show what they enter into their calculators. Examples:
  - The bicycle shop bought 10 bicycles from the factory for a total of R4 456,78. They sold them for R656,99 each. How much profit did they make on all the bicycles?
  - Mr Dumalo's monthly budget is R3 546. Last month he spent: R1 899 on food, R324 on electricity and water, R320 on transport and R526 on other expenses. Was he within his budget? If so, by how much?

ASSESSMENT	**Informal:** Assess the learners' ability to co-operate with their peers. Mark their class work books to see if they remember budget, profit and loss.

Grade 6: Week 10

Hours: 5	**Number of Periods: 5**
Mathematics LO 4 AS 3	**Milestones:** • Describe and illustrate ways of measuring in different cultures throughout history, including informal measuring systems.

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:	History of Measurement	History of Measurement	Divisibility rules: 2, 3 and 9	Revise and consolidate year's work to date.	Revise and consolidate year's work to date.
Resources	Information on History of Measurement (see Addendum) Worksheet, textbook, chalkboard.	Information on History of Measurement (see Addendum)	Chalkboard and worksheets.	Chalkboard, worksheets and textbooks.	Chalkboard, worksheets and textbooks.

WEEK 10: Day 1

Notes to the teacher:

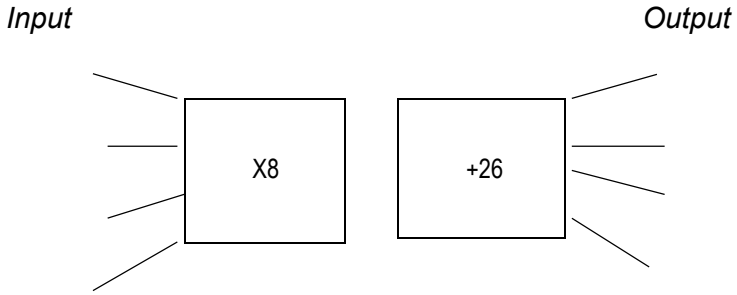
- In today's lesson, the learners can continue working on their projects on history of Measurement. These must be completed today for presentation over the next two lessons.
- The learners will also do some problem solving.

Resources: Information on History of Measurement (see Addendum). Chalkboard, textbook, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Give the learners flow charts (spider grams) to complete. Draw about four on the board with different operators (in the example below, the operators are x8 and +26). Give four to five different input values in each flow chart. Learners must calculate the output values.



Group work (30 minutes)

- Learners must work on and complete their projects on History of Measurement today. If you chose to give the learners a different activity (questions to answer, crossword puzzle etc as per the ideas in the Addendum), give them one of these activities now to complete in their groups. Make sure all the learners are working properly and co-operating within their groups.

Revision (20 minutes)

- Revise properties of shapes and solids, done in the first term. Find an exercise in the textbook in which learners have to:
  - Name 2-dimensional shapes and classify them in terms of their properties: length and number of sides and angles in the corner.
  - Name 3-dimensional objects and classify them in terms of their properties, i.e. faces, vertices and edges.
- If no suitable exercises can be found, make a worksheet or use the chalkboard.

ASSESSMENT	**Informal:** Assess the learners' ability to work with peers in a group and how they are showing an understanding of measurement in the past in the work they are doing.

WEEK 10: Day 2

Notes to the teacher:

- In today's lesson, the learners must present their projects on History of Measurement to the class. If they have an activity for the learners to complete, this must also be completed. If they have questions for a quiz, do the quiz today.
- After all the groups have completed their presentation, give some feedback. Ask the learners what they learnt, did they find it interesting, etc.

Resources: Learners' prepared presentations. Task for consolidation.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Clock multiplication." (See Addendum Mental Strategies). Focus on the 8x and 9x tables.
- Give the learners 10 multiplication tables sums. Say the sum and they must write down the answer only. Do all tables up to 12x12. Include multiplication by 0. Afterwards, the learners can swop books and mark each other's work.

Project Presentation (35 minutes)

- Depending on what project you gave the learners to complete will affect how it is presented. If you are doing a quiz, do it now and keep points. If each group is doing a presentation, song or rap, they must present it to the class now. If you decided on an inter-group competition with different activities, the learners must complete that activity (e.g. a word search).

Consolidation (15 minutes)

- Discuss the various projects. Conclude with a written task for all the learners to complete. This task should have about 20 questions on the history of measurement which the learners can complete, individually in their workbooks. Examples of questions:
  - What system of measurement do we use?
  - What was the origin of a mile?
  - What were barleycorns used for?
  - What is a royal cubit?
    Which country used the royal cubit first?
  - Name one unit used to measure distance in the imperial system?
  - Name one unit used to measure weight in the imperial system.

ASSESSMENT	**Informal:** From the groups' presentations and from their answers to the questions in their workbooks, you will be able to assess whether the learners gained any insight into the history of measurement.

WEEK 10: Day 3

Notes to the teacher:

- All the work that was required to be completed for the third term has been done by now.
- In today's lesson, we will examine divisibility rules of 2. If a number is divisible, it means 2 divides into it without a remainder. This is a concept that will be covered again in the fourth term.
- Divisibility rules of 3 will also be taught in this lesson. This is not required according to the Assessment Standards, but is useful to know.
- Learning divisibility rules also revises the concept of multiples.

Resources: Chalkboard, worksheets. Calculators.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Write rows of numbers on the board with different operators. Learners must find the pairs of numbers (sometimes more than one pair in a row) which make the total given, using the given operator. Give the learners about 20 to do, individually in their workbooks. Afterwards, they can swop books and mark each other's work. Examples:
  - ⊞ 22; 122; 584; 478; 188; Total: 300
  - ⊠ 24; 8; 56; 30; 10; Total: 240

Concept Development (20 minutes)

- Ask learners to write down as many multiples of 2 as they can in a given time. They must start with 2. They can write these down on a piece of paper, or in the back of their workbooks.
  - When you tell the learners to stop writing, see which learner managed to write down the most. Give him/her a small reward.
  - Ask a few learners in turn to read out five or six multiples that they wrote down. Where one learner stops, the next one can continue.
  - Ask the learners what they notice about the last digit in each of the multiples they have written down? They all end in a 0, 2, 4, 6 or 8. What do we call these numbers? Even numbers.
  - Ask the learners whether we can conclude that every even number is divisible by 2. Let them check, using their calculators. Write a number on the board, and let the learners divide the number using their calculators. Practise reading the number. Write, e.g. 55 516. After the learners have divided this number by 2, ask them what they notice about the digits comprising the number. They are all odd numbers, except for the last digit. Was this number still divisible by 2? Yes. As long as the number ends on a 0, 2, 4, 6, or 8, it is an even number and divisible by 2. Repeat with three or four other numbers.
- Tell the learners you are now going to show them a way to see if a number is divisible by 3. Using the constant key on their calculators, ask them to find multiples of 3. As they do this, they can call out the multiples, group by group, while you (or an appointed learner) writes them on the board. The first group says 3, the next group says 6, and the next group says 9, and so on. Stop when you get to about 72.

- The first 3 multiples are 3, 6 and 9. All the rest of the multiples contain two (or more) digits). Explain to the learners that you are now going to add the digits of the multiples of 3, and see what happens: 12: 1+2=3; 15: 1+5=6; 18: 1+8=9; 21: 2+1=3; 24: 2+4=6: …. Go to 72: 7+2=9. Ask the learners what they notice. When we add the digits of a multiple of 3, the answer is 3, 6 or 9.
- Write the following numbers on the board and ask the learners to work out which numbers are divisible by 3: 171; 268; 372. 1+7+1=9, so 171 is divisible by 3. 2+6+8=16. 1+6=7. 268 is not divisible by 3. 3+7+2=12. 1+2=3. 372 is divisible by 3.

Continue adding the digits until you have only one digit

Consolidation (15 minutes)

- Make a worksheet or write work on the board for the learners to complete, individually in their workbooks. Write about 30 numbers comprising 4 or more digits.
  - Learners must circle numbers that are divisible in one colour, and numbers that are divisible by 3 in another colour.
  - Learners may not use their calculators.
  - Afterwards, they can write down all the numbers that are divisible by 2 and 3 (the common multiples). Ask the learners which other number would divide into these common multiples? It is 6.

Problem Solving (15 minutes)

- Give the learners number sentences. They can work in pairs to write problems to fit the number sentences. Afterwards, they can do the calculations. For example:
  - 32x24+16. Possible problem: The farmer had 32 boxes of 24 eggs and 16 extra eggs. How many eggs did he have altogether?

ASSESSMENT	**Informal:** From the learners' verbal responses and their written work, you will be able to ascertain whether the learners understand these divisibility rules.

WEEK 10: Day 4

Notes to the teacher:

- Use the last two lessons of the term to revise and consolidate everything taught so far. You can also revise concepts taught in the first and second terms.
- The completed and marked Assessment Task will also give you a clear indication of any areas of weakness. Focus on these areas to make sure that all your learners are competent in all concepts.
- Learners can never have too much practice in mathematical skills. The more they practise, the better they will become.
- Many textbooks have general revision sections. Select appropriate examples from these for the learners.

Resources: Chalkboard, textbooks, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do a round or two of "Tables King" (see Addendum Mental Strategies).
- Ask ten problems, the learners must write down the answers only. Examples:
  - There are 32 learners in the class. $\frac{1}{8}$ of them were absent on a particular day. How many learners were at school?
  - There are 72 learners who go home by taxi. A taxi can transport 12 learners. How many taxis are needed?
  - It takes the teacher 4 minutes to mark a learner's book. How long will it take her to mark 25 books (in hours and minutes)?

Revision (20 minutes)

- Revise concepts according to your learners' needs. Spend time working through these concepts with your learners. If you choose to revise addition and subtraction of Mixed numbers, write an example on the board. Ask the learners step-by step what to do, and explain clearly. Alternatively, a few learners can do calculations in their own workspace on the board, and afterwards you go through a correct calculation step by step.

Problem Solving (15 minutes)

- Give the learners problems to solve that entail the concept(s) revised today. If there are learners who are still unsure, help them in a small group while the rest of the class works.

Consolidation (15 minutes)

- Give the learners more practice in the concept(s) revised today by finding suitable examples in the textbooks, making a worksheet, or writing sums on the chalkboard.

WEEK 10 : Day 5

Notes to the teacher:

- Use this lesson to revise and consolidate everything taught so far. You can also revise concepts taught in the first and second terms.
- The completed and marked Assessment Task will also give you a clear indication of any areas of weakness. Focus on these areas to make sure that all your learners are competent in all concepts.
- Learners can never have too much practice in mathematical skills. The more they practise, the better they will become.

Resources: Textbook, chalkboard, worksheets.

DAILY ACTIVITIES

Oral and Mental Activity (10 minutes)

- Do some "Running Maths" (See Addendum Mental Strategies)
- Ask learners to do some calculations in their heads. Ask the first learner who you see put their hand up to give you the answer. Examples:
  - Double 228
  - Halve 564
  - 12x0x6

Revision (25 minutes)

- Revise concepts according to your learners' needs. Spend time working through these concepts with your learners. Whatever you choose to revise, write an example on the board. Ask the learners step-by step what to do, and explain clearly.
- If you feel there is nothing in particular you need to revise, play Place Value Bingo (see Addendum Mental Strategies for instructions).

Further revision (25 minutes)

- Divide the class into four teams. Divide the chalkboard into four columns to create a working space for a learner from each team to work in.
  - Write an addition sum on the board. A learner from each group must come and do the sum in his/her working space. The first learner to get the sum correct gets 4 points for their team; the second gets 3 points, the third 2 points and the last one finished gets 1 point for their team.
  - Repeat with a subtraction sum and a different learner from each group.
  - Repeat with other sums until all the learners have had at least one turn.
  - Add up the points to see which group won and give them a reward (a few minutes extra break time perhaps.)

ADDENDUM: MENTAL STRATEGIES GRADE 6 THIRD TERM

Note:
The Lesson Plans refer to these activities. Refer to activities described in Term 2 Addendum as well. These activities are also referred to in the Term 3 lesson plans.
All these activities will require explanation the first time you use them, but after a bit of practice, the learners will know what you mean when you tell them what activity you are going to do.

PLACE VALUE BINGO

Preparation: To play this game for 7-digit numbers, you will need to create 7 sets of 10 = 70 small cards. The first set will be Ones (Units). On the top of each card in this set, write "Ones" or "Units". Then write the number 0 to 9 on each card.

UNITS 0	UNITS 1	UNITS 2	UNITS 3	UNITS 4
UNITS 5	UNITS 6	UNITS 7	UNITS 8	UNITS 9

You can make the cards out of old cereal box cardboard. Keep the cards; you can use them again and again.

Make 6 more sets for each place value, i.e. Tens, Hundreds, Thousands, Ten Thousands, Hundred Thousands, and Millions. It might be a good idea to write each set on a different coloured cardboard, or in a different coloured marker. Put all the cards in a plastic bag, plastic container (old ice-cream tub) or any box. Shake the box so the cards are well shuffled.

Learners must take out a piece of paper and, using a marker or pen, write down a seven digit number.

To play: Pick a card from the container and call out the number on the card. For example, 9 000. If the learner has a 9 in the thousands place they must circle the number. Do not put the card back in the container; you need it to check later. Continue until a learner has circled all the numbers on their piece of paper, at which point he or she must call out "BINGO". Check that the learner has all the correct numbers. The learner must first say the whole number to you, and then tell you which numbers he/she has, for example, I have 4 000 000 (or a 4 in the millions place), 200 000, 9 000, and so on. If the learner has all the correct numbers, he/she wins. Try to give a small reward. You can continue until one or two more learners get "Bingo" (let the winning learner call the numbers) or start another game with new numbers.

ADDENDUM HISTORY OF MEASUREMENT

The metric system of measurement is the system we know. It was introduced into South Africa, starting in1967. Prior to that, we used imperial measurements.

A metre is the basic unit of measurement of length. Where does a metre come from? It is one millionth of the distance between the North Pole and the equator.

Previous measuring systems were based on parts of the body. Because everyone's bodies are different, measurements differed slightly until there was standardisation.

Why did people need to measure? People originally were hunters and gatherers, then herders. Once they settled down to farm, they needed to measure their piece of land. Also, the need to measure developed with increased trade.

The first unit of measurement was the cubit, developed about 5 000 years ago in Egypt.. This was the distance from a man's elbow to the tip of his outstretched fingers. Eventually, this was standardised and called a royal cubit.

The "Royal Cubit Master" was carved out of a block of granite to endure for all times. Workers engaged in building tombs, temples, pyramids, etc. were supplied with cubits made of wood or granite. The Royal Architect or Foreman of the construction site was responsible for maintaining & transferring the unit of length to workers instruments. They were required to bring back their cubit sticks at each full moon to be compared to the Royal Cubit Master. Failure to do so was punishable by death.

With this standardization and uniformity of length, the Egyptians achieved surprising accuracy. Thousands of workers were engaged in building the Great Pyramid of Giza. Through the use of cubit sticks, they achieved amazing accuracy.

COMPARISONS BETWEEN METRIC AND IMPERIAL MEASUREMENTS OF LENGTH.		
	Metric	Imperial
Length	Based on scientific principles. Use metres as basic unit. Multiply and divide by 10, 100 or 1 000 to convert between different units. We basically use *four* of these units (mm, cm, m and km)	Traditionally based on nature and everyday activities. Used miles, yards, feet, inches. 12 inches = 1 foot. 3 feet = 1 yard 36 inches = 1 yard. 5 280 feet = I mile 1 760 yards = 1 mile ….And to add to the confusion, there were other units of measurement of length: 8 furlongs = 1 mile 10 chains = 1 furlong 22 yards = 1 chain

Origins of some imperial measurements of length.

Mile: A mile is a Roman unit. It used to be the length of 1 000 paces of a Roman legion. A pace means two steps, right and left. For a long time, people did not need to be precise about this as it did not matter if the next town was 32 or 33 miles away. Eventually the mile was standardized, to equal 8 furlongs.

Furlong: came from the way ploughed fields were measured. A furrow was the distance a horse could easy plough and became the basis for a “furlong” (furrow long). It is 1/8 of a mile.

Chains: 10 chains made up a furlong. These were literally chains that were used by surveyors for measuring and were standardized at 22 yards

Inch: This was the measurement of 3 barleycorns.

It also represented the width of a thumb.

Foot: This was originally the length of a human foot. It was later 36 barleycorns.

Yard (3 feet) seems to have originated as the name of a 3-foot measuring stick. Using a man’s body, it is roughly the length from the tip of the nose to the end of the middle finger of the

outstretched hand.

League: was based on the distance that can be walked in an hour.

Fathom: We still talk of the depth of the sea in fathoms. Sailors would drop a weighted rope into the water, lowering it by lengths (where each length of was measured by holding the rope between their outstretched hands) until the weight at the end of the rope touched the seabed. It used to be the length from one fingertip to the other if you stretch your arms out to the sides as far as they will go. This distance between the tips of your middle fingers will be very close to your height.

Hand: The width of your four fingers where they meet the palm—usually about 4 inches (10 cm) —is a *handbreadth* or sometimes just a "hand." The height of horses is usually expressed in hands.

COMPARISONS BETWEEN METRIC AND IMPERIAL MEASUREMENTS of CAPACITY		
	Metric	Imperial
Capacity	Based on scientific principles. Use litres as basic unit. Multiply and divide by 10, 100 or 1 000 to convert between different units. We basically use *three* of these units (ml, l and kl)	Used gallons, quarts, pints and fluid ounces: 1 gallon = 4 quarts 2 pints = 1 quart 20 ounces = 1 pint These were British measures. They differed from the US measures.

Some origins

Gallon This was originally the name of a standard container that could carry 8 pounds of wheat (see Mass for pounds). A gallon of beer was a different size to a gallon of wheat, so this was very confusing. In 1824 the Imperial Gallon was designed to hold exactly 10 pounds of water.

COMPARISONS BETWEEN METRIC AND IMPERIAL MEASUREMENTS of MASS		
	Metric	Imperial
Mass	Based on scientific principles. Use gram as basic unit. Multiply and divide by 10, 100 or 1 000 to convert between different units. We basically use *three* of these units (gram, kg and ton)	Used pounds and ounces. 16 ounces = 1 pound ton

Some origins and things of interest

Grain was the weight of a single barleycorn. Precious metals were weighed using grains.

Pound was a Roman unit. In Roman times, the pound was divided into 12 ounces. Merchants preferred to use a 16 ounce pound as this could be divided into halves, quarters or eighths. In England, the various pound weights were multiples of the grain.

Since 1400 in England, the hundredweight was used. This is actually equal to 112 pounds, as this number can be divided by 2, 4, 8 and 16.

Stone. People in England still refer to their weight in Stones. A stone is 14 pounds, equal to one eighth of a hundredweight.

Ton. In the metric system, 1 ton = 1 000 kg. The British "long" ton was equal to 2 240 pounds (20 hundredweight) and was originally a unit of wine measure. The American "short" ton was 2 000 pounds, based on the Americans' definition of the hundredweight of 100 pounds.

MONEY

Until 1961, South Africans used Pounds, shillings and pence (pennies).

12 pennies =	1 shilling
20 shillings =	1 pound

Compare this with our easy, decimalised system, of Rands and cents, where 100 cents = a Rand.

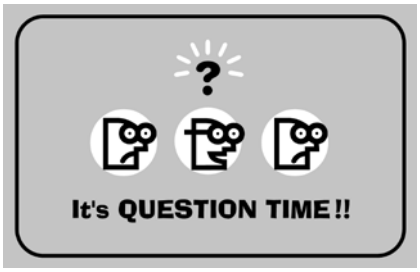
ADDENDUM HISTORY OF MEASUREMENT PROJECT.

The topic, History of Measurement, is ideal for group work. How you deal with it is up to you, the facilities you have at school and the learners' environment.
This integrates with History and English.
There is a great deal of in-depth information on this topic. The information included in the Addendum is a fairly simple summary. If your learners have the resources, they can do further research.
The earliest forms of measurement were the first steps towards Mathematics.
The learners must be led to realise how complicated other systems were. Imagine doing calculations converting between imperial units of lengthL

Divide your learners into groups. Make sure there are learners of all abilities within each group. Go through and discuss the information with them. *Some ideas* for group work:

- Each group can be given a different aspect of the history of measurement to investigate and research. They can present their information to the rest of the class in the form of an oral and a poster with illustrations. They can create an activity, based on their presentation, for the class to do. For example, they can compile a quiz or make a simple worksheet.
- Groups can make a song or rap about a different aspect of measurement. Because the use of parts of the body was the basis of measuring length, the learners could enjoy doing a rap with movements.
- Each group can compile ten questions based on the information. Each question must be written, with its answer, on a separate piece of paper. When they have had enough time to do this, put all the questions in a container, and have an inter-group competition quiz.
- Learners can produce a short play in which they debate the advantages and disadvantages of the old imperial system vs. the metric system.
- Each group can summarise the information on an illustrated poster, showing the origins of different units of measurement.
- Each day, give the groups a different task to complete, and award point according to which group completed the task first, second, third, etc with the most correct. Day 1: 20 questions to answer from the information. Day 2: a Crossword puzzle. Day 3: A word search.

ADDENDUM – DATA HANDLING POSSIBLE QUESTIONS AND CATEGORIES



In what year were you born: 1996, 1997, 1998, 1999?
In what month were you born? Jan-Mar, April-June, July-Sept, Oct-Dec
How many people in your house: 1- 3, 4, 5, 6, more than 6
What sort of house do you live in: shack, flat, townhouse, free-standing house, traditional house?
How many people live in your house? 2, 3, 4, 5, more than 5
How many people in your house are still at school? 1, 2, 3, 4, more than 4

How do you get to school? Walk, cycle, bus, taxi, private car
What is your home language? Xhosa, Tswana, Afrikaans, English, Other
How is your home heated? Electricity, gas, paraffin, open fire (wood or coal), other
How does your family cook your food? Gas stove, paraffin stove, electric stove, microwave oven?
How tall are you? 1,5 m, 1,6 m, 1,7 m, 1,8 m, 1,9 m

What is your favourite fast-food outlet? McDonald's, Steers, Kentucky Fried, Nando's, other
What is your favourite cold drink?
What is your favourite colour?

DATA HANDLING ASSIGNMENT

Everything to be presented neatly on A4 paper, in the learners' workbooks or on posters.

SECTION 1: YES/NO QUESTIONNAIRE

Learners must:

1. Design a questionnaire to which people being asked answer "Yes" or "No". The question must be clearly stated on the questionnaire.
2. Ask at least 20 people the question. Their names do not have to appear, as they might want their answers to remain confidential.
3. Record their answers
4. Say whether the people who answered the question are a sample or a population, and explain why.

SECTION 2: TALLIES AND PICTOGRAPHS

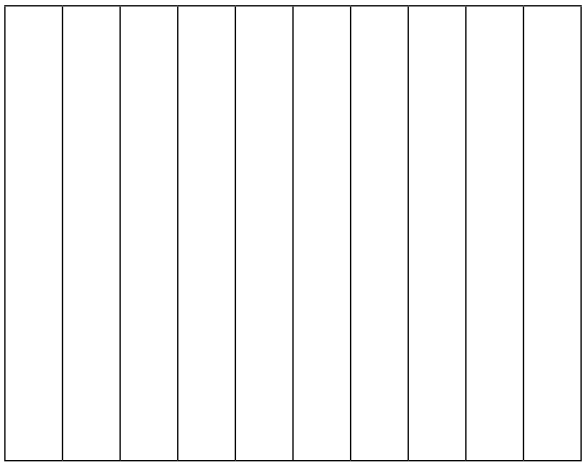
Learners must:

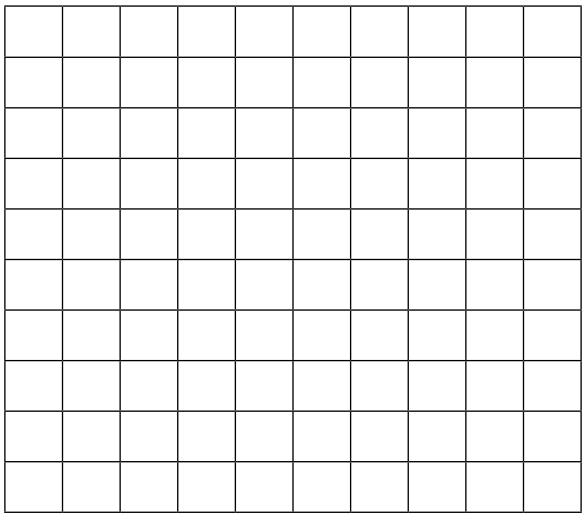
1. Conduct a survey about a relevant topic (family issues, environment issues, school issues, learners' preferences).
2. Decide on at least 5 categories within the topic from which the people being questioned must choose to respond to. (See *Addendum: Data Handling* for some ideas).
3. Collect data from at least 25 people and record their responses in a neat tally chart.
4. Explain whether this is a sample or population.
5. Draw a neat pictograph to display the information. The pictograph must have a key, a heading and correct labels.

NOTES:

1. Questions should not violate peoples' privacy. Do not ask personal questions such as household income etc.
2. If it is not appropriate for learners to ask questions of people in the community (you will know from the community in which they live), questions can be asked of their peers and classmates in school. However, try to avoid giving them class time to ask questions.

ADDENDUM: DECIMAL FRACTIONS TENTHS AND HUNDREDTHS





ADDENDUM – INVOICE FOR FILLING IN (READING ACCOUNTS)

Invoice

Date:
Invoice #:
Customer ID:

To:

Delivery
Address:

Salesperson	Delivery Method	Delivery Date	Due Date for Payment of this account

Qty	Item #	Description	Unit Price	Discount	Total
			Total Discount		
				Subtotal	
				Sales Tax	
				Total amount payable	

Make all cheques payable to

Thank you for your business!

YOUR LOGO HERE

Invoice

[Your Company Name]
[Your Company Slogan Here]

Date:	February 10, 2010
Invoice #:	[100]
Customer ID:	[ABC12345]

To:	Ship to:
[Name]	[Name]
[Company Name]	[Company Name]
[Street Address]	[Street Address]
[City, ST ZIP Code]	[City, ST ZIP Code]
[Phone]	[Phone]

Salesperson	Job	Shipping Method	Shipping Terms	Delivery Date	Payment Terms	Due Date

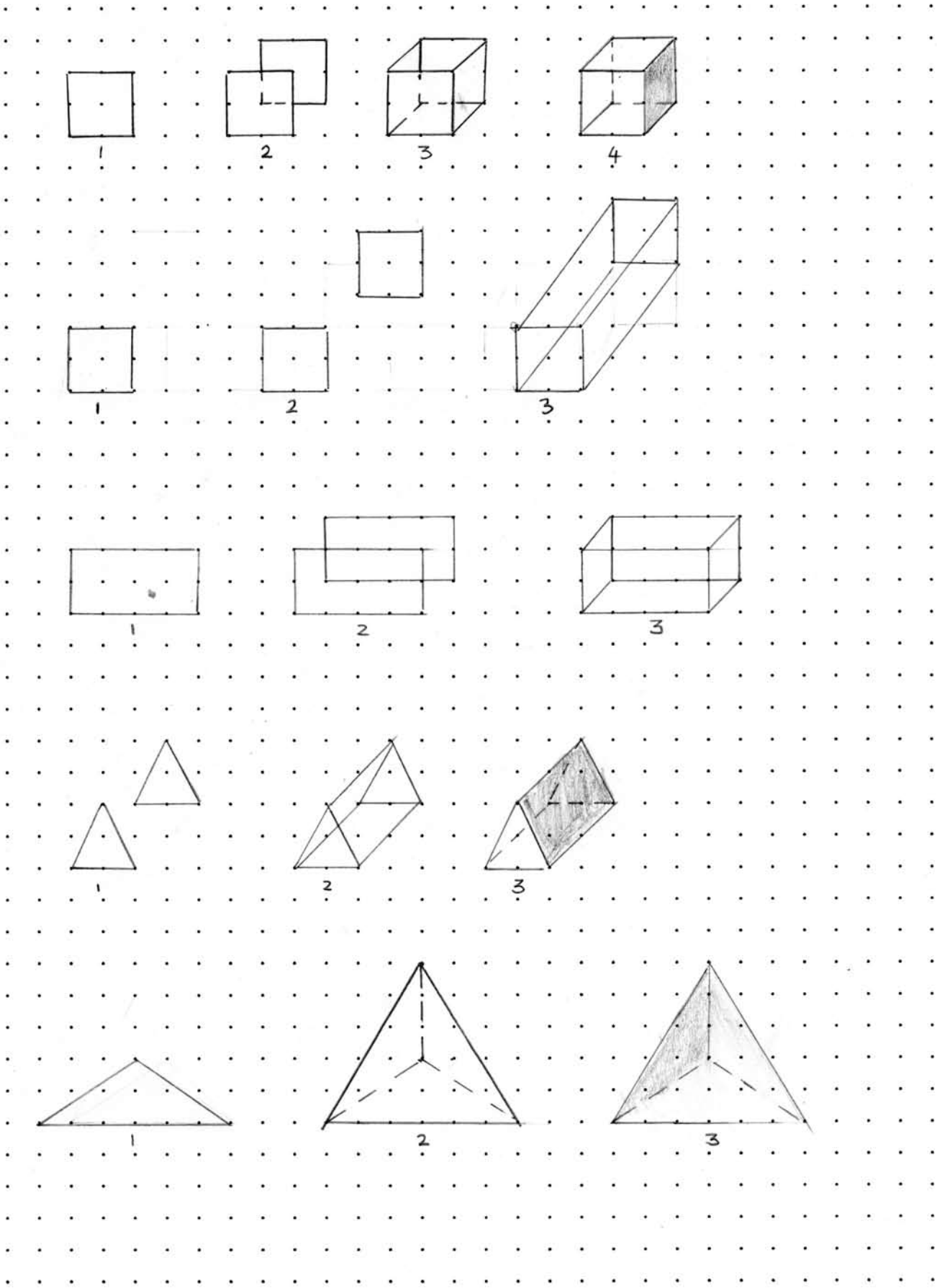
Qty	Item #	Description	Unit Price	Discount	Line Total
			Total Discount		
				Subtotal	
				Sales Tax	
				Total	

Make all checks payable to [Your Company Name]

Thank you for your business!

[Street Address], [City, ST ZIP Code] [Phone] [Fax] [E-mail]

ADDENDUM 3D OBJECTS ON DOTTED PAPER



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