Grade 5

# CONTENT BOOKLETS: TARGETED SUPPORT

Term 1

# A MESSAGE FROM THE NECT

## NATIONAL EDUCATION COLLABORATION TRUST (NECT)

**Dear Teachers**

This learning programme and training is provided by the National Education Collaboration Trust (NECT) on behalf of the Department of Basic Education (DBE)! We hope that this programme provides you with additional skills, methodologies and content knowledge that you can use to teach your learners more effectively.

**What is NECT?**

In 2012 our government launched the National Development Plan (NDP) as a way to eliminate poverty and reduce inequality by the year 2030. Improving education is an important goal in the NDP which states that 90% of learners will pass Maths, Science and languages with at least 50% by 2030. This is a very ambitious goal for the DBE to achieve on its own, so the NECT was established in 2015 to assist in improving education.

The NECT has successfully brought together groups of people interested in education so that we can work collaboratively to improve education. These groups include the teacher unions, businesses, religious groups, trusts, foundations and NGOs.

**What are the Learning programmes?**

One of the programmes that the NECT implements on behalf of the DBE is the 'District Development Programme'. This programme works directly with district officials, principals, teachers, parents and learners; you are all part of this programme!

The programme began in 2015 with a small group of schools called the Fresh Start Schools (FSS). The FSS helped the DBE trial the NECT Maths, Science and language learning programmes so that they could be improved and used by many more teachers. NECT has already begun this scale-up process in its Provincialisation Programme. The FSS teachers remain part of the programme, and we encourage them to mentor and share their experience with other teachers.

Teachers with more experience using the learning programmes will deepen their knowledge and understanding, while some teachers will be experiencing the learning programmes for the first time.

Let's work together constructively in the spirit of collaboration so that we can help South Africa eliminate poverty and improve education!

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# CONTENTS

# TOPIC 1: WHOLE NUMBERS

## INTRODUCTION

- This unit runs for 2 hours.
- This unit is part of the content area ‘Numbers, Operations and Relationships’. It counts for 50% of the final exam.
- The unit covers whole numbers up to 4-digit numbers.
- The purpose of this section is to further develop a functional number sense.

# SEQUENTIAL TEACHING TABLE

| GRADE 4<br>FOUNDATION PHASE | GRADE 5<br>INTERMEDIATE PHASE | GRADE 6<br>INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Count forwards and backwards in 2s, 3s, 5s, 10s, 25s, 50s, 100s to at least 10 000<br>• Order, compare and write numbers to at least 4 digits<br>• Round off to the nearest 10, 100 or 1 000<br>• Write odd and even numbers to 1 000<br>• Recognize place value of digits in 4-digit numbers<br>• Add and subtract whole numbers of at least 4 digits<br>• Use the following strategies:<br>  • estimating<br>  • building up/breaking down<br>  • number lines<br>  • rounding/ compensating<br>  • doubling and halving<br>  • addition/subtraction as inverse operations | • Count forwards and backwards in whole number intervals up to at least 10 000<br>• Order, compare, write numbers to at least 6 digits<br>• Round off to the nearest 5, 10, 100 or 1 000<br>• Write odd and even numbers to 1 000<br>• Recognize place value of digits in 6-digit numbers<br>• Add and subtract whole numbers of at least 5 digits<br>• Use the following strategies:<br>  • estimating<br>  • building up/breaking down<br>  • number lines<br>  • rounding/compensating<br>  • doubling and halving<br>  • addition/subtraction as inverse operations<br>  • calculating in columns | • Order, compare and represent numbers to at least 9 digits<br>• Round off to the nearest 5, 10, 100, 1 000, 10 000, 100 000 and 1 000 000<br>• Write prime numbers to 1 000<br>• Recognize place value of digits in 9 digit numbers<br>• Add and subtract whole numbers of at least 6 digits<br>• Use the following strategies:<br>  • estimating<br>  • building up/breaking down<br>  • rounding/compensating<br>  • addition/subtraction as inverse operations<br>  • calculating in columns<br>  • using a calculator |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Whole numbers** | Positive integers, i.e. numbers not broken into fractions or decimals |
| **Place Value** | The value of where the digit is in the number.<br>In 14 728, the 2 is in the "tens" position, so it shows a value of 20 |
| **Order** | Arrangement of numbers from largest to smallest or smallest to largest. |
| **Compare** | Look at different numbers and see which is bigger, the same or smaller than another. |
| **Round off** | Rounding means to make a number simpler but keeping its value close to what it was.<br>Example: 73 rounded to the nearest ten is 70, because 73 is closer to 70 than to 80.<br>But 76 goes up to 80, because 76 is closer to 80 than to 70. The rounding indicators for rounding down are 1, 2, 3 and 4 and for rounding up they are 5, 6, 7, 8 and 9. |
| **Expanded Notation** | This means to break a number up so that each place value is written as an individual number<br>647 835 = 600 000 + 40 000 + 7 000 + 800 + 30 + 5 |
| **Odd Numbers** | These numbers are not divisible by 2 and start at 1.<br>All numbers are odd which end with 1, 3, 5, 7 and 9. |
| **Even Numbers** | These numbers are divisible by 2.<br>All numbers are even which end with 2, 4, 6, 8 and 0.<br>Zero itself is neither odd nor even. |

# SUMMARY OF KEY CONCEPTS

## Counting up to 10 000

Count backwards and forwards in various intervals, starting at any number, including numbers that are, and numbers that are not multiples of the number in which counting is done.

**For example:**

a. Count in tens from 234 to 304: 234, 244, 254, 264, 274, 284, 294, 304.

b. Count backwards in sixes from 45: 45, 39, 33, 27, 21, 15, 9, 3.

## Place value to 6 digits

1. In table form:

| | HT Hundred Thousands | TT Ten Thousands | T Thousands | H Hundreds | T Tens | U Units |
|---|---|---|---|---|---|---|
| Digits | 3 | 1 | 4 | 7 | 2 | 8 |
| What the digit means in terms of its position | This stands for 2 hundred thousands | This stands for 10 thousand | This stands for 4 thousands | This stands for 7 hundreds | This stands for 2 tens | This stands for 8 ones or units |
| Numeric | 30 000 | 10 000 | 4 000 | 700 | 20 | 8 |
| How you would say it | Three hundred thousand | Ten thousand | Four thousand | Seven hundred | Twenty | Eight |
| What each digit stands for | The digit 3 stands for 300 000 | The digit 1 stands for 10 000 | The digit 4 stands for 4 000 | The digit 7 stands for 700 | The digit 2 stands for 20 | The digit 8 stands for 8 |
| The value of the digit | The value of the digit 3 is 300 000 | The value of the digit 1 is 10 000 | The value of the digit 4 is 4 000 | The value of the digit is 700 | The value of the digit 2 is 20 | The value of the digit 8 is 8 |

2. In numerals it is written as: **314 728**

3. In words it is written or said as: **Three hundred and fourteen thousand, seven hundred and twenty-eight.**

4. Expanded Notation: **300 000 + 10 000 + 4 000 + 700 + 20 + 8**

### Smaller than: <

Which number is smaller, 37 981 or 37 600?

As both numbers share the 3 and 7 in 37 000, we look at the following digit, in the hundreds, in order to compare.

| TT<br>Ten<br>Thousand | T<br>Thousand | H<br>Hundred | T<br>Ten | U<br>Units<br>(One) |
|---|---|---|---|---|
| 3 | 7 | 9 | 8 | 1 |
| | | | | |

**6** hundred is **smaller** than **9** hundred. So, 37 600 is smaller than 37 981.

### Greater than: >

Which number is greater, 12 935 or 12 946?

| TT<br>Ten<br>Thousand | T<br>Thousand | H<br>Hundred | T<br>Ten | U<br>Units<br>(One) |
|---|---|---|---|---|
| 1 | 2 | 9 | 3 | 5 |
| 1 | 2 | 9 | 4 | 6 |

- A table makes it easier to work out which number is bigger/smaller.
- Work from left to right.
- If they are the same, continue to compare until the values of the digits are not the same.
- The values of the digits in the hundreds place are not the same.

**4** tens is **greater** than **3** tens. So 12 946 is **greater** than 12 935

### Order: arrange the numbers from smallest to biggest

324 688, 32 468, 246 880

See which number has the **least** digits. Then follow the above table method to find out which number with the same amount of digits, is smaller/bigger.

*Answer: 32 468, 246 880, 324 688*

### Compare: arrange the numbers from biggest to smallest

32 468, 324 688, 246 880

*Answer: 324 688, 246 880, 32 468*

See which number has the most digits. Then follow the above table method to find out which number with the same amount of digits, is smaller/bigger.

### Round off to nearest 10, 100 and 1 000

Rounding is a systematic thinking process as follows:

1. Decide which digit is the last digit you want to focus on. You will know this because it is the digit in the place you are asked to round off to.
2. Leave it the same if the next digit is less than 5

**Example:** Round 74 to the nearest 10
We want to focus on the 7 in the 10s place
The next digit is 4 which is less than 5, so no change is needed to 7
= 70
74 gets rounded down

3. Increase it by 1 if the next digit is 5 or more

**Example:** Round 86 to the nearest 10
We want to focus on the 8 in the 10s place
The next digit is 6 which is 5 or more, so increase the 8 by 1 to 9
= 90
86 gets rounded up

# TOPIC 2: NUMBER SENTENCES

## INTRODUCTION

- This unit runs for 3 hours.
- This unit falls under “Numbers, Operations, and Relationships” which counts 50% of the final exam.
- The unit covers Number Sentences and prepares learners to write algebraic equations.
- Number sentences are a way of showing equivalence.
- The purpose of this section is to understand how to make a decision about the choice between the calculations and to learn various calculation techniques.

## SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Write number sentences to describe a problem situation<br>• Solve and complete number sentences by inspection and trial and improvement<br>• Check solution by substitution | • Write number sentences to describe a problem situation<br>• Solve and complete number sentences by inspection and trial and improvement<br>• Check solution by substitution | • Write number sentences to describe a problem situation<br>• Solve and complete number sentences by inspection and trial and improvement<br>• Check solution by substitution |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Inverse operations**<br>**+ and –**<br>**x and ÷** | Addition can be checked by subtraction as its inverse operation:<br>25 + 67 = 92 and 92 - 25 = 67<br>Multiplication can be checked by division as its inverse operation:<br>8 x 9 = 72 and 72 ÷ 8 = 9 |
| **Multiplicative Property of 1** | Multiplying by one leaves a number unchanged.<br>e.g. 8 x 1 = 8 and 27 x 1 = 27<br>Dividing by one leaves a number unchanged as well.<br>e.g. 8 ÷ 1 = 8 and 27 ÷ 1 = 27<br>1 is the identity element for multiplication and therefore also for division - the identity of a number remains unchanged when multiplied or divided by 1. |
| **Associative Property** | Grouping numbers differently for addition or multiplication does not change the value of the answer<br>[7 + 3] + 5 = 15 or 7 + [3 + 5] = 15<br>[2 x 3] x 4 = 24 or 2 x [3 x 4] = 24<br>This law does not work for subtraction and division |
| **0 - Additive Property** | Adding or subtracting a zero leaves a number unchanged<br>e.g. 8 + 0 = 8 and 27 + 0 = 27<br>e.g. 8 – 0 = 8 and 27 – 0 = 27<br>0 is the identity element for addition and therefore also for subtraction - the identity of a number remains unchanged when 0 is added or subtracted. |
| **Commutative Property** | The order of numbers in addition and multiplication does not matter: because the answer stays the same for any order in which numbers are arranged<br>4 + 2 = 6 and 2 + 4 = 6<br>4 × 5 = 20 and 5 × 4 = 20<br>This law does not work for subtraction or division. |

# SUMMARY OF KEY CONCEPTS

## Additive Inverse Property

The additive inverse of a number is what you add to a number to create the sum of zero. So if I have 2 and I add -2 to it, it will result in 0.

Practically we can illustrate this by the example of someone owing another R8 (-8) and then paying the person R8 (8), which results in a zero balance: 8 - 8 = 0

63 – 63 = ___

498 – 498 =___

279 – 5 + 5 = ___

5983 – 6 + 6 = ___

67 + 5 = ___ + 4 (67 + 5 = 68 + 4) taking one off 5 needs adding one to 67

## Inverse Operations

Focus on addition undoing subtraction and subtraction undoing addition.

56 – 12 =___ therefore 44 + 12 = ___

475 + 300 = ___ therefore 775 – 300 = ___

## Commutative Property

Numbers can be added in any order.

17 + 25 = 25 + 17

125 + 12 + 67 = 67 +125 + 67

This property can make calculations easier or can be used in equivalent statements.

## Associative Property

This property allows numbers to be grouped in different ways when adding more than two numbers.

(356 + 12) + 19 = 356 + (12 +19)

Learners are not expected to name the properties but need to be able to work with them and understand the principles.

### Breaking up before adding

463 + 749 = 400 + 60 + 3 + 700 + 40 + 9 can be written as 400 + 700 + 60 + 40 + 3 + 9. In this example the numbers are grouped differently but the answer is the same.

### Order of subtraction

68 – 53 is not the same as 53 – 68 as they do not result in the same answer.

### Addition and subtraction facts for multiples of 10

Addition and subtraction of numbers that have a final digit of zero (0). Learners must be able to perform several calculations with these numbers. Calculations must be performed with numbers of varying digits, but these numbers must be multiplies of 10.

**Examples:**

10 = 5 + ___ and  10 – 5 =___

100 = 60 + ___ and 100 – 60 = ___

1 000 = 700 + ___ and 1 000 – 700 =___

# TOPIC 3: WHOLE NUMBERS – ADDITION AND SUBTRACTION

## INTRODUCTION

- This unit runs for 5 hours.
- This unit is part of the content area 'Numbers, Operations and Relationships'. This counts for 50% of the final exam.
- This unit covers addition and subtraction of whole number up to 5 digits.
- The purpose of this unit is to further develop number sense in the additive field which includes addition and subtraction.

## SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Describe, order, compare whole numbers up to at least 5-digit numbers<br>• Round off to 10, 100 and 1 000<br>• Represent odd and even numbers to at least 1 000<br>• Add and subtract whole numbers of at least 4 digits<br>• Use the following strategies:<br>  • building up/breaking down<br>  • number lines<br>  • rounding off<br>  • compensating<br>  • addition and subtraction as inverse operations | • Describe, order, compare whole numbers up to at least 6-digit numbers<br>• Round off to 5, 10, 100 and 1 000<br>• Represent odd and even numbers to at least 10 000<br>• Add and subtract whole numbers of at least 5 digits<br>• Use the following strategies:<br>  • building up/breaking down<br>  • number lines<br>  • rounding off<br>  • compensating<br>  • addition and subtraction as inverse operations<br>  • adding and subtracting in columns | • Describe, order, compare whole numbers up to at least 9-digit numbers<br>• Round off to 5, 10, 100, 1 000, 100 000, 1 000 000<br>• Represent prime numbers to at least 100<br>• Add and subtract whole numbers of at least 6 digits<br>• Use the following strategies:<br>  • building up/breaking down<br>  • number lines<br>  • rounding off<br>  • compensating<br>  • addition and subtraction as inverse operations<br>  • adding and subtracting in columns<br>  • using a calculator |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Equation** | An equation is a mathematical statement where two expressions which are separated by the = sign are equal in value. for example 14 x 3 = 40 + 2. |
| **Estimation** | To reach a reasonable approximate answer without calculating. |
| **0 - Additive Property** | Adding or subtracting a zero leaves a number unchanged<br>e.g. 8 + 0 = 8 and 27 + 0 = 27<br>e.g. 8 − 0 = 8 and 27 − 0 = 27<br>0 is the identity element for addition and therefore also for subtraction - the identity of a number remains unchanged when 0 is added or subtracted. |
| **Commutative Property** | The order of numbers in addition and multiplication does not matter: because the answer stays the same for any order in which numbers are arranged<br>4 + 2 = 6 and 2 + 4 = 6<br>4 × 5 = 20 and 5 × 4 = 20<br>This law does not work for subtraction or division. |
| **Multiplicative Property of 1** | Multiplying by one leaves a number unchanged.<br>e.g. 8 x 1 = 8 and 27 x 1 = 27<br>Dividing by one leaves a number unchanged as well.<br>e.g. 8 ÷ 1 = 8 and 27 ÷ 1 = 27<br>1 is the identity element for multiplication and therefore also for division - the identity of a number remains unchanged when multiplied or divided by 1. |
| **Breaking down numbers according to place value** | 9 875 = 9 000 + 800 + 70 + 5 |

# SUMMARY OF KEY CONCEPTS

## Bond connections

1. The basic facts of bonds can help to add other numbers.

   5 + 3 = 8 … 15 + 3 = 18 … 25 + 3 = 28 … 65 + 3 = 68...

   56 + 9 = 65 560 + 90 = 650 … 5 600 + 900 = 6 500…

2. The basic facts of bonds can also help with subtraction.

   7 – 2 = 5 … 17 – 2 = 15 … 47 – 2 = 47 …

   16 – 12 = 4 … 26 – 12 = 14 … 86 – 12 = 74…

## Making up 10s

Patterns in addition

Bonds of ten help to make addition easier, for example if numbers can be grouped to add up to a multiple of ten.

Look for pairs of numbers that can give a result of 10, 100 or 1 000

**Example:** 6 + 5 + 2 + 5 + 4 + 8 = 30

Because 6 + 4 = 10

5 + 5 = 10

2 + 8 = 10

all together = 30

## Adding up to 4-digit numbers

1. Find the sum of 2 147 and 3 375 by breaking up both numbers.
   2 147 + 3 375
   = (2 000 + 100 + 40 + 7) + (3 000 + 300 + 70 +5)
   = (2 000 + 3 000) + (100 + 300) + (40 + 70) + (7 + 5)
   = 5 000
   + 400
   + 110
   + 12
   = 5 522
2. Find the sum of 2 597 + 3 886 by breaking up both numbers.
   2 597 + 3 886
   = (2 000 + 500 + 90 + 7) + (3 000 + 800 + 80 + 6)
   = (2 000 + 3 000) + (500 + 800) + (90 + 80) + (7 + 6)
   = 5 000 + 1 300 + 170 + 13
   = 6483
3. Find the sum of 2 597 + 3 886 by breaking up the second number.
   2 597 + 3 886
   = 2 597 + (3000 + 800 + 80 + 6)
   = (2 597 + 3 000) + 800 + 80 +6
   = (5 597 + 800) + 80 + 6
   = (6 397 + 80) + 6
   = 6 477 + 6
   = 6 483
4. Find the sum of 2 597 + 3 886 by compensation.
   2 597 + 3 886 (round one number, like rounding 2 597 to 2 600 by adding 3, then compensate by subtracting 3 from the other number. This means you work with two different, but easier numbers of which the total value has not changed).
   2597 + 3 = 2 600
   3 886 – 3 = 3 883
   2 600 + 3 883
   = 6 483

## Subtraction

1. Find the difference between 3 749 and 1 228 by breaking up both numbers.
   3 749 – 1 228
   = (3000 + 700 + 40 + 9) – (1 000 + 200 + 20 + 8)
   = (3 000 - 1 000) + (700 - 200) + (40 - 20) + (9 – 8)
   = 2 000 + 500 + 20 + 1
   = 2 521

2. Find the difference between 3 749 and 1 228 by breaking up the second number.

   1 228 = 1 000 + 200 + 20 + 8
   3 749 – 1 228
   3 749 – 1000
   = 2 749
   2 749 – 200
   = 2 549
   2 549 - 20
   = 2 529
   2 529 – 8
   = 2 521

3. Adding on to the smaller number until you reach the bigger number.

   3 749 – 1 228

| | |
|---|---|
| 1 228 + 1 = 1 229 | From the 8 of 1228, you want to reach the 9 of 3 749 |
| 1 229 + 20 = 1 249 | From the 20 of 1228, you want to reach the 40 of 3 749 |
| 1 249 + 500 = 1 749 | From the 200 of 1228, you want to reach the 700 of 3 749 |
| 1 749 + 2 000 = 3 749 | From the 1 000 of 1228, you want to reach the 3 000 of 3 749 |

   Add the shaded numbers and you get the answer: 2 521

## Order of operations with Addition and Subtraction

When we have + and - in a number sentence, we work from left to right.

5 + 4 - 3 = 9 - 3 = 6

and

25 - 13 + 34 = 12 + 34 = 46

# TOPIC 4: NUMERIC PATTERNS

## INTRODUCTION

- This unit runs for 4 hours.
- This unit is part of the content area 'Patterns, Functions and Algebra'. This counts for 10% of the final exam.
- The unit covers numeric patterns. Learners should understand and develop the use of input, rules and output values.
- The purpose of this section is to develop skills needed for algebra.

## SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Investigate and extend numeric patterns according to rules<br>• Find a constant difference in patterns<br>• Find a constant ratio in a numeric pattern<br>• Describe relationships in words and diagrams<br>• Create and describe own patterns<br>• Complete flow diagrams with two actions or a double rule<br>• Understand the effect of inverse operations on input/output values | • Investigate and extend numeric patterns looking for relationships and rules<br>• Find a constant difference in a numeric pattern<br>• Find a constant ratio in a numeric pattern<br>• Describe relationships in words, diagrams, tables<br>• Complete flow diagrams with two actions or a double rule<br>• Understand that the input value is derived from the inverse operations. | • Investigate and extend numeric patterns looking for relationships and rules<br>• Find a constant difference in a numeric pattern<br>• Find a constant ratio in a numeric pattern<br>• Describe relationships in words, diagrams and tables<br>• Describe rules in general terms<br>• Complete flow diagrams with two actions or a double rule<br>• Understand that the input value is derived from the inverse operations |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Numeric Patterns** | A sequence of numbers where each consecutive term follows a rule so that the pattern repeats in a predictable manner.<br>Example: 4, 7, 10, 13... |
| **Input Values** | A given number to which a rule (specific operations) will be applied. |
| **Output Values** | The result when a rule (specific operations) were applied to an input number.<br>Example: In the above pattern, the input values 1, 2, 3, 4... may be given, and the rule applied: multiply by 3 and add 1, when then gives the output numbers 4, 7, 10, 13... |
| **Relationships** | Consecutive terms stand in a relationship to each other. In our example, the relationship is a constant difference of 3.<br>Output numbers stand in a relationship to input numbers. This relationship is determined by the rule of the pattern. |
| **Flow Diagram** | A diagram which flows horizontally from the input number(s) through the rule (operations) to the output number(s). |
| **Tables** | For ordering a numeric pattern in input- and output pairs, a table is used where input-output values are related vertically, but the rule does not appear. A table (sometimes called a flow chart) is helpful to create coordinate pairs for graphing and also to deduct the rule for the pattern. |
| **Inverse operations** | Addition can be checked by subtraction.<br>$25 + 67 = 92$ and $92 - 25 = 67$<br>Multiplication can be checked by division<br>$8 \times 9 = 72$ and $72 \div 8 = 9$ |
| **Associative Property** | Grouping numbers in addition and multiplication differently, does not change the answer<br>$(7 + 3) + 5 = 15$ or $7 + (3 + 5) = 15$<br>$(2 \times 3) \times 4 = 24$ or $2 \times (3 \times 4) = 24$<br>This law does not work for subtraction and division |

# SUMMARY OF KEY CONCEPTS

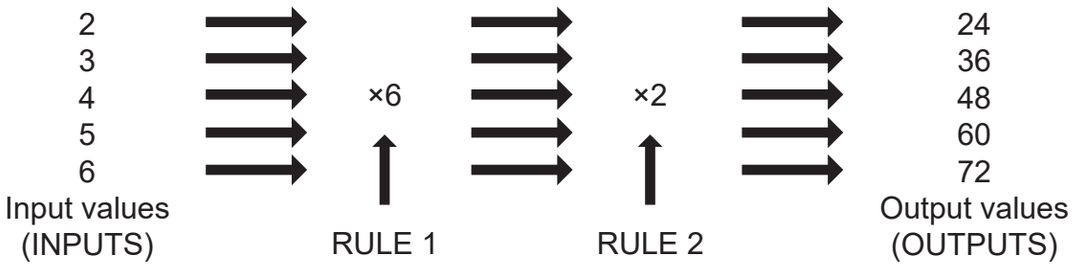
### Using flow diagrams to multiply and divide numbers

1. The diagrams show the relationships between numbers


The diagram means:
1 x 150 = 150
2 x 150 = 300
3 x 150 = 450
4 x 150 = 600

The resulting outputs for the input values 1, 2, 3, 4... form a numeric pattern, 150, 300, 450, 600... This pattern is based on the rule x 150.

2. Input-output diagrams with two-part rules

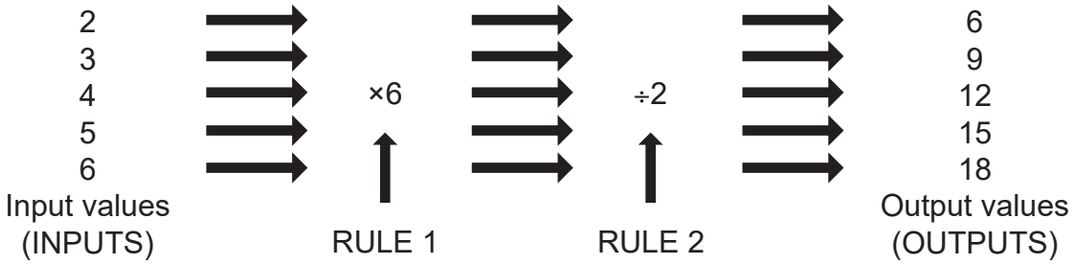



Number sentences for this input-output diagram

2 x 6 x 2 = 24
3 x 6 x 2 = 36
4 x 6 x 2 = 48
5 x 6 x 2 = 60
6 x 6 x 2 = 72

The resulting outputs for the input values 2, 3, 4, 5, 6... form a numeric pattern, 24, 36, 48, 60, 72... This pattern is based on the rule x 6 x 2.

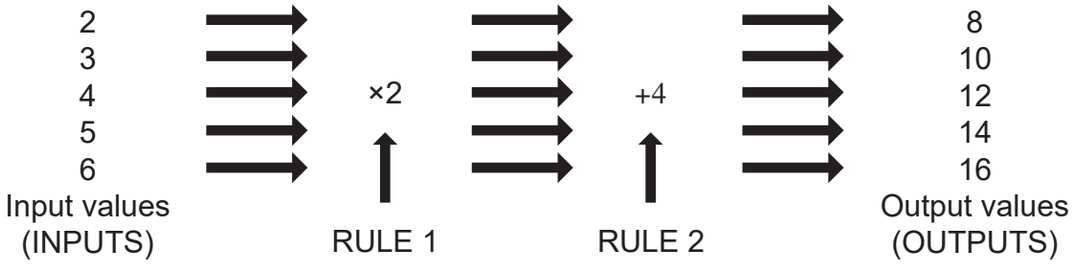
## Using flow diagrams to investigate the order of operations




Number sentences for this input-output diagram

2 x 6 ÷ 2 = 6
3 x 6 ÷ 2 = 9
4 x 6 ÷ 2 = 12
5 x 6 ÷ 2 = 15
6 x 6 ÷ 2 = 18

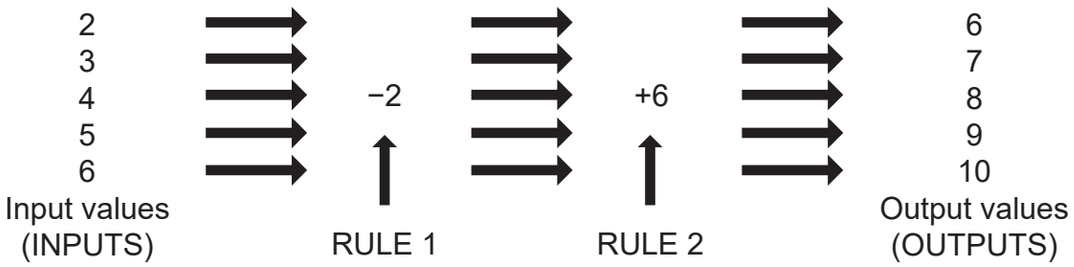
The resulting outputs for the input values 2, 3, 4, 5, 6... form a numeric pattern, 6, 9, 12, 15, 18... This pattern is based on the rule x 6 ÷ 2.




Number sentences for this input-output diagram

2 x 2 + 4 = 8
3 x 2 + 4 = 10
4 x 2 + 4 = 12
5 x 2 + 4 = 14
6 x 2 + 4 = 16

The resulting outputs for the input values 2, 3, 4, 5, 6... form a numeric pattern, 6, 8, 10, 12, 14, 16... This pattern is based on the rule x 2 + 4.




Number sentences for this input-output diagram

2 − 2 + 6 = 6

3 − 2 + 6 = 7

4 − 2 + 6 = 8

5 − 2 + 6 = 9

6 − 2 + 6 = 10

The resulting outputs for the input values 2, 3, 4, 5, 6... form a numeric pattern, 6, 7, 8, 9, 10... This pattern is based on the rule -2 + 6.

# TOPIC 5: WHOLE NUMBERS – MULTIPLICATION AND DIVISION

## INTRODUCTION

- This unit runs for 6 hours.
- This unit forms part of the content area 'Numbers, Operations and Relationships', an area which counts for 50% of the final exam.
- The unit covers multiplication and division in an expanded range.
- The purpose of this section is to develop an understanding of the operations in the multiplicative field.

## SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Multiply at least 2-digit by 1-digit numbers<br>• Multiply using estimation, doubling and halving, building up and breaking down, rounding off and compensating<br>• Round off and estimate up to at least 9 999<br>• Divide at least 3-digit numbers by 1-digit number<br>• Solve problems involving equal sharing and grouping with remainders<br>• Solve problems of equal sharing and grouping leading to solutions that are fractions | • Multiply at least 3-digit by 2-digit numbers<br>• Multiply using estimation, doubling and halving, building up and breaking down, rounding off and compensating<br>• Round off and estimate up to at least 99 999<br>• Divide at least 3-digit numbers by 2-digit number<br>• Solve problems involving equal sharing and grouping with remainders<br>• Solve problems of equal sharing and grouping leading to solutions that are fractions | • Multiply at least 4-digit by 3-digit numbers<br>• Multiply whole numbers with or without brackets<br>• Multiply using estimation, doubling and halving, building up/breaking down, rounding off, compensating and using the standard vertical column algorithm<br>• Round off and estimate up to at least 999 999<br>• Divide at least 4-digit numbers by 3-digit number<br>• Solve problems involving equal sharing and grouping with remainders<br>• Recognise rate as a form of division<br>• Divide by means of the standard vertical algorithm |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Multiplication** | This is repeated addition but we can group numbers and multiply instead.<br>3 + 3 + 3 + 3 + 3 + 3 = 18 or 6 x 3 = 18 |
| **Division** | This is sharing or grouping items equally.<br>12 ÷ 6 = 2<br>12 items shared into 6 groups is 2 |
| **Product** | This is a number that is the answer to a multiplication calculation.<br>e.g. 6 x 3 = 18, so so 18 is the product of 6 x 3 |
| **Factors** | The factors of a number are all the numbers that can be divided perfectly into that number (without a remainder). For example, the factors of 30 are 2, 3, 5, 6, 10 and 15. |
| **0 – Additive Property** | If we add or subtract 0 to any number, it remains the same. Zero does not change numbers when it is added or subtracted from those numbers. It is called the identity element of addition. |
| **1 – Multiplicative Property** | If we multiply or divide any number by 1, it remains the same; 1 does not change numbers when it is multiplied with or divided into those numbers. It is called the identity element of multiplication. |
| **Distributive Property** | A number that appears before a set of numbers in bracket, is multiplied with all the numbers in the brackets, for example<br>3(4 + 5) = 3 x 4 + 3 x 5. This is called the distributive property of multiplication over addition. |
| **Parts of a Multiplication Sum** | 3 x 5 = 15<br>multipicand multiplier product |
| **Parts of a Division Sum** | 15 ÷ 3 = 5<br>divisor dividend quotient |
| **Inverse Operations** | Multiplication can be checked by division<br>8 x 9 = 72 and 72 ÷ 8 = 9 |
| **Multiples** | A multiple is formed when two or more numbers are multiplied by each other/one another. The product is a multiple of all those numbers and all their combinations, for example<br>2 x 3 x 5 = 30, so 30 is a multiple of 2, 3, 5, 6, 10 and 15. |
| **Commutative Law** | The order of numbers in addition and multiplication does not matter<br>4 + 2 = 6 and 2 + 4 = 6<br>4 x 5 = 20 and 5 x 4 = 20<br>This law does not work for subtraction or division. |

# SUMMARY OF KEY CONCEPTS

## Multiplication

1. Commutative Property
   4 x 5 = 20 and 5 x 4 = 20
   a x b = b x a
2. Associative Property
   (2 x 3) x 4 = 24 or 2 x (3 x 4) = 24
   (a x b) x c = a x (b x c)
3. Distributive Property
   a(b + c) = (a x b) + (a x c)
   a(b - c) = (a x b) – (a x c)
4. Multiplicative Property
   Multiplying by one leaves a number unchanged.
   8 x 1 = 8 and 27 x 1 = 27
   t x 1 = t

## Inverse Operation

Multiplication can be checked by division.

8 x 9 = 72 and 72 ÷ 8 = 9

## Multiples

Multiples are numbers that can be divided by another number without a remainder.

Multiples are the answers we get when we multiply a number by another number.

1. 3 x 7 = 21
   so 3 and 7 are factors of 21 and 21 is a multiple of both 3 and 7.
2. To find the multiples of a given number:
   Find the multiples of 3.
   3 x 1 = 3 3 x 2 = 6 3 x 3 = 9 3 x 4 = 12
   [3; 6; 9; 12…] this list goes on indefinitely.

3. If you are asked to find the first 5 multiples of a number it means these can be found by multiplying the given number by 1, 2, 3, 4, and 5 in turn. The products will be the first 5 multiples of the number.

**Example:**
2 x 1 = 2  2 x 2 = 4  2 x 3 = 6  2 x 4 = 8  2 x 5 = 10
[2, 4, 6, 8, 10] this list has 5 multiples and is closed as you were asked for the first 5 multiples of 2.

## Factors

Factors are the numbers you multiply together to get another number.

6 x 5 = 30, so 6 and 5 are factors of 30

To find the factors of a given number:

**Example:** Find the factors of 20

Think: which numbers can be multiplied together to make 20:

1 x 20 = 20  2 x 10 = 20  4 x 5 = 20

So: the factors of 20 are: [1, 2, 4, 5, 20]

## Multiplication of 2-digits by 2-digits

1. Breaking one number up into its terms and applying the distributive property of number for multiplication over addition:

**Example:** 45 x 6
Knowing that 45 x 6 = 6 x 45 and that 45 = 40 + 5, it can be written as follows:

45 x 6 = 6 x 45

= 6 x (40 + 5)

= (6 x 40) + (6 x 5)

= 240 + 30

= 270

2. Breaking one number up into its factors (which numbers multiplied give me the number?) and applying the associative property of numbers for multiplication:

**Example:** 45 x 6 = 9 x 5 x 6
= 9 x (5 x 6)
= 9 x 30
= 270

3. Doubling and halving – a strategy that can be done if one of the numbers is divisible by 2:

**Example:** 45 x 6 = (double 45 and halve 6)
= 90 x 3
= 270

4. Vertical method

$$\begin{array}{r} {\scriptstyle 1\ \ \ } \\ {\scriptstyle 3}\,4\ 5 \\ \times\quad 2\ 6 \\ \hline 2\ 7\ 0 \\ +\ 9\ 0\ 0 \\ \hline 1\ 1\ 7\ 0 \end{array}$$

## Division

1. Breaking up the dividend into its terms and dividing the divisor into each term separately, then adding the quotients

**Example:** 396 ÷ 6 = (300 + 90 + 6) ÷ 6
= (300 ÷ 6) + (90 ÷ 6) + (6 ÷ 6)
= 50 + 15 + 1
= 66

This strategy works only for numbers where each part of the dividend can be divided by the divisor.

2. Breaking up the divisor into its factors and dividing the dividend each time by one of the factors of the divisor, then adding the quotients

**Example:** 396 ÷ 6 = (396 ÷ 3 ÷ 2)
Divide the dividend by 3:

396 ÷ 6 = (100 + 30 + 2)
= 132

Divide the previous quotient by 2

132 ÷ 2 = (150 +15 +1)
= 66

3. Halving works for division only if both the dividend and the divisor can be divided by two:

**Example:** 396 ÷ 6
Halve both the dividend (396 halved is 198) and the divisor (6 halved is 3). Use the halved numbers and divide them
198 ÷ 3 = 66

4. Vertical Method

```
   . 6 2
4 | 2 4 8
  - 2 4
    . . 8
      - 8
```

# TOPIC 6: TIME

## INTRODUCTION

- This unit runs for 6 hours.
- This unit forms part of the content area ‘Measurement’ and counts for 15% of the final exam.
- The unit covers telling the time and measuring time.
- The purpose of this section is to develop the concept of measuring time periods and mastering the various units used in time.

# SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Read time and time instructions:<br>  • read, tell and write time in 12 hour and 24 hour notation<br>  • understand digital and analogue instruments (clocks and watches) in hours, minutes and seconds<br>• Read calendars<br>• Calculate and solve problems involving time in:<br>  • number of days between two dates<br>  • number of hours and minutes between two times<br>• History of time<br>  • Know some ways in which time was measured and represented in the past | • Read time and time instructions:<br>  • read, tell and write time in 12 hour and 24 hour notation<br>  • understand digital and analogue instruments (clocks and watches) in hours, minutes and seconds<br>• Read calendars<br>• Calculate and solve problems involving time in:<br>  • number of days between two dates<br>  • number of hours and minutes between two times<br>  • number of days, weeks and months in a time interval<br>  • Number of years and decades in a time interval<br>• History of time<br>  • Know some ways in which time was measured and represented in the past | • Read time and time instructions:<br>  • read, tell and write time in 12 hour and 24 hour notation<br>  • understand digital and analogue instruments (Clocks, watches and stopwatches) in hours, minutes and seconds<br>• Read calendars<br>• Calculate and solve problems involving time in:<br>  • number of days between two dates<br>  • number of hours, minutes and seconds between two times<br>  • time zones on a map<br>  • number of days, weeks and months in a time interval<br>  • number of years and decades in a time interval<br>  • Number of decades and centuries in a time interval<br>• History of time<br>  • Know some ways in which time was measured and represented in the past |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Digital (24 hour clock)** |  <br>This is a type of clock that displays the time digitally in numerals. |
| **Analogue (12 hour clock)** |  <br>This is a clock where the time is indicated by the position of moving hands and hours marked from 1 to 12 to show the time. |
| **Time** | Way in which we measure a day or any period, like a minute, a year, a week, etc |
| **Calendar** | Way in which the days, weeks and the months of the year are calculated. |
| **Past and To** | The long hand of the clock shows the minutes.<br>When the long hand moves from 12 to 6 we say that it is 'past' a certain hour.<br>When the long hand moves from the 6 to 12 we say that it is ___ minutes to the hour.<br>If the long hand is on the 3 we say it is quarter-past<br>If the long hand is on the 6 we say it is half-past<br>If the long hand is on the 9 we say it is quarter-to the hour |
| **Stopwatch** |   <br>A stopwatch is used to measure an exact duration of time that is taken to do something (such as to time a race). |
| **Term** | **Explanation / Diagram** |
| **BC** | Before Christ – time before Christ's birth<br>Or you may see:<br>BCE stands for Before Common Era |
| **AD** | Anno Domini – time after Christ's birth (Anno Domini means: The Year of Our Lord.)<br>Or you may see:<br>CE which stands for Common Era. |

# SUMMARY OF KEY CONCEPTS

### Time

60 seconds (s) = 1 minute (m)

60 minutes = 1 hour (h)

24 hours = 1 day (d)

7 days = 1 week (wk)

### Calendar

365 days = 1 year (leap year 366 days)

12 months = 1 year (yr)

52 weeks = 1 year (yr)

10 years = 1 decade (dec)

### Conversions

Break up hours and minutes, months and years, hours and days to work out a variety of times.

1. How many seconds and minutes are there in 158 seconds?
   158 seconds = 120 seconds + 38 seconds = 2 minutes 38 seconds
2. How many minutes in 1 hour 34 minutes?
   1 hour = 60 minutes + 34 minutes = 94 minutes
3. How many days in 4 consecutive weeks?
   1 week = 7 days x 4 = 28 days
4. Decade: how many years in 5 decades?
   1 decade = 10 years x 5 = 50 years
5. How many decades from 2001 to 2011?
   1 decade = 10 years so from 2001 to 2011 there are 10 years = 1 decade

## Digital Time vs. Analogue Time

1. 4:23 on a digital clock is read as four twenty-three but we could also say it is twenty-three minutes past four (AM) or in the morning.
2. 17:35 on a digital clock is read as seventeen thirty-five but we could say twenty-five minutes to six (PM) or in the evening.

## 24-Hour Clock vs. 12-Hour Clock

The left hand column shows the 24-hour clock and the right hand column shows the 12-hour clock.

| 24 Hour Clock | 12 Hour Clock a.m./p.m. |
|---|---|
| 0:00 | 12 Midnight |
| 1:00 | 1:00 a.m. |
| 2:00 | 2:00 a.m. |
| 3:00 | 3:00 a.m. |
| 4:00 | 4:00 a.m. |
| 5:00 | 5:00 a.m. |
| 6:00 | 6:00 a.m. |
| 7:00 | 7:00 a.m. |
| 8:00 | 8:00 a.m. |
| 9:00 | 9:00 a.m. |
| 10:00 | 10:00 a.m. |
| 11:00 | 11:00 a.m. |
| 12:00 | 12:00 Noon |
| 13:00 | 1:00 p.m. |
| 14:00 | 2:00 p.m. |
| 15:00 | 3:00 p.m. |
| 16:00 | 4:00 p.m. |
| 17:00 | 5:00 p.m. |
| 18:00 | 6:00 p.m. |
| 19:00 | 7:00 p.m. |
| 20:00 | 8:00 p.m. |
| 21:00 | 9:00 p.m. |
| 22:00 | 10:00 p.m. |
| 23:00 | 11:00 p.m. |

## Ancient Calendars

The moon, sun and seasons were used by ancient people; such as the Khoi-San and the people of Namibia, known as the Himba. In Herero, the language of the Himba, the word for day is the same as the word 'sun' and the word for year is the word 'rain', because they mark days by the sun and years by the beginning of the rainy season.

The Western Calendar, which we use in South Africa, is divided into the time before Christ's birth, BC, and the time after his birth, AD.

# RESOURCES

**HEBREW CALENDAR**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| year | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | common |
| year | 2 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | common |
| year | 3 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | leap |
| year | 4 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | common |
| year | 5 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | common |
| year | 6 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | leap |
| year | 7 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | common |
| year | 8 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | leap |
| year | 9 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | common |
| year | 10 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | common |
| year | 11 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | leap |
| year | 12 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | common |
| year | 13 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | common |
| year | 14 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | leap |
| year | 15 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | common |
| year | 16 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | common |
| year | 17 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | leap |
| year | 18 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | common |
| year | 19 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | leap |

## ROMAN CALENDAR



ROMAN CALENDAR

| A K·IAN·F | H K·FEB·N | D K·MAR·ÞP | C K·APR·F | A K·MAI·F | H K·IVN·N | F K·IVL·N | E K·AVG·F | D K·SEP·F | B K·OCT·N | A K·NOV·F | G K·DEC·N |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B F | A N | E F | D F | B F | A F | G N | F F | E F | C F | B F | H N |
| | | F C | | C C | | H N | | | D C | | |
| C C | B N | G C | E C | D C | B C | A N | G C | F C | E C | C C | A N |
| | | H C | | E C | | B POPLI·ÞP | | | F C | | |
| D C | C N | A C | F C | F C | C C | C N | H C | G C | G C | D C | B C |
| E NON·F | D NON·N | B NON·F | G NON·N | G NON·F | D NON·N | D NON·N | A NON·N | H NON·N | H NON·F | E NON·N | C NON·N |
| F F | E N | C F | H N | H F | E N | E N | B F | A F | A F | F F | D F |
| G C | F N | D C | A N | A LEM·N | F N | F N | C C | B C | B C | G C | E C |
| H C | G N | E C | B N | B C | G N | G C | D C | C C | C C | H C | F C |
| A AGON·ÞP | H N | F C | C N | C LEM·N | H VEST·N | H C | E C | D C | D MEDI·ÞP | A C | G C |
| B C | A N | G C | D N | D C | A N | A C | F C | E C | E C | B C | H C |
| C CAR·ÞP | B N | H EN | E N | E LEM·ÞP | B MATR·N | B C | G C | F C | F FONT·ÞP | C C | A AGON·ÞP |
| D C | C N | A EQVIR·ÞP | F N | F C | C N | C C | H C | G C F | G EN | D C | B EN |
| E EIDVS·ÞP | D EIDVS·ÞP | B EIDVS·ÞP | G EIDVS·ÞP | G EIDVS·ÞP | D EIDVS·ÞP | D EIDVS·ÞP | A EIDVS·ÞP | H EIDVS·ÞP | H EIDVS·ÞP | E EIDVS·ÞP | C EIDVS·ÞP |
| F EN | E N | C F | H N | H C | E N | E C | B F | A F | A F | F F | D F |
| G CAR·ÞP | F LVPER·ÞP | D LIBER·ÞP | A FORDI·ÞP | A C | F Q·ST·D F | F F | C C | B C F | B C | G C | E CONS·ÞP |
| H C | G EN | E C | B N | B C | G C | G C | D C | C C | C C | H C | F C |
| A C | H QVIR·ÞP | F QVIN·ÞP | C N | C C | H C | H LVCAR·ÞP | E PORT·ÞP | D C | D ARMI·ÞP | A C | G SATVR·ÞP |
| B C | A C | G C | E CERIA·ÞP | D C | A C | A C | F C | E C | E C | B C | H C |
| C C | B C | H C | F N | E AFON·ÞP | B C | B LVCAR·ÞP | G VINAL·F | F C | F C | C C | A OPA·ÞP |
| D C | C N | A N·F | G PARIL·ÞP | F N F | C C | C C | H C | G C | G C | D C | B C |
| E C | D FERA·F | B TVBIL·ÞP | H N | G TVBIL·ÞP | D C | D NEPT·ÞP | A CONS·ÞP | H C | H C | E C | C DIVAL·ÞP |
| F C | H O·R·C·F F | C Q·R·C·F F | A VINAL·F | H O·R·C·F F | E C | E C | B EN | A C | H C | F C | D C |
| G C | E C | D C | B C | A C | F C | F FVR·ÞP | C VOLK·ÞP | B C | A C | G C | E LARE·ÞP |
| H C | F TERM·ÞP | E C | C ROBIG·ÞP | B C | G C | G N | D C | C C | B C | H C | F C |
| A C | G REGIF·N | F C | D C | C C | H C | H C | E OPIC·ÞP | D C | C C | A C | G C |
| B C | H C | G C | E C | D C | A C | A C | F C | E C | D C | B C | H C |
| C C | A EN | H C | F C | E C | B C | C C | G VOLT·ÞP | F C | E C | C C | A C |
| D C | B EQVIR·ÞP | A C | G C | F C | D C | C C | H C | G C | F C | D C | B C |
| E C | C C | B C | H C | G C | E C | B C | A C | F C | G C | E C | C C |
| F C | | | | | | | B C | | | F C | D C |
| G C | | | | | | | C C | | | | E C |
| XXXI | XXIX | XXXI | XXX | XXXI | XXX | XXXI | XXXI | XXX | XXXI | XXX | XXXI |

# TOPIC 7: DATA HANDLING

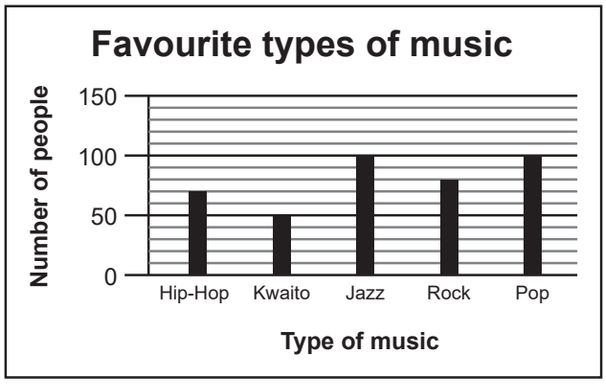
## INTRODUCTION

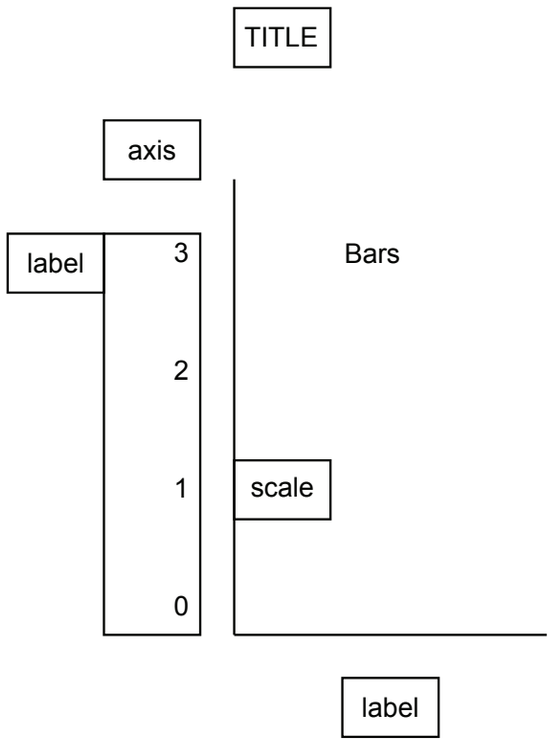
- This unit runs for 10 hours.
- The unit forms part of the content area 'Data Handling' and counts for 10% of the final exam.
- The unit covers data handling. Learners need to draw graphs and need to critically read data from given graphs.
- The purpose of this section is to develop their abilities to process volumes of information statistically.

## SEQUENTIAL TEACHING TABLE

| GRADE 4 INTERMEDIATE PHASE | GRADE 5 INTERMEDIATE PHASE | GRADE 6 INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Collect and record data through tally-marks<br>• Represent data in words, bar graphs, pictograms (one-to-one correspondence) and pie charts<br>• Answer questions related to data categories<br>• Critically read and interpret data<br>• Summarise data verbally and in written form | • Collect and arrange data from smallest to largest<br>• Represent data in words, pictograms (many-to-one correspondence) and bar graphs<br>• Answer questions related to data categories, sources and contexts<br>• Read and interpret data<br>• Summarise data verbally and written, draw conclusions and make predictions<br>• Determine the mode of the data set | • Collect and arrange data from smallest to largest<br>• Represent data in words, in a pictogram (many-to-one correspondence), single and double bar graph, pie chart<br>• Answer questions related to the data<br>• Set and administer simple questionnaire to collect data<br>• Read and interpret data<br>• Summarise data, draw conclusions and make predictions<br>• Determine the mode and median of the data set |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **Tally** | This is an easy way to add up counts when you are collecting information from your data source.<br>  <br>5<br>The 4 lines represent 4 items counted and the 5th is a line drawn across the other 4 lines.. |
| **Pictograph**<br>**Many-to-One** | **Apples picked at Jozi Farm**<br>**Months** \| **= 10 apples**<br>**January** 8 apples<br>**February** 6 apples<br>**March** 3 apples<br>**April** 3 apples |
| **Bar graph** | A bar graph is a way of showing data that uses horizontal or vertical rectangular bars.<br>  <br> |

| Term | Explanation / Diagram |
|---|---|
| **Parts of a Graph** | These are the conventions for a graph.<br>  <br> |
| **Axes – vertical and horizontal** | x axis - horizontal →<br>y axis - vertical ↑ |
| **Mode** | This is the number that appears the most in the data set. |

# SUMMARY OF KEY CONCEPTS

## Collecting and ordering data

1. Data Collection

Data can be collected in different ways.

- The simplest way is observation.
- e.g. you want to find how many cars pass by a certain point on a road in a 10-minute interval.
- To find out: stand at that point on the road, and count the cars that pass by in that interval.

a. Data can be collected by doing surveys
To do this:
Survey people (through questionnaires, opinion polls, etc.) or observe things (like pollution levels in a river, or favourite colours).

Here are four steps to a successful survey:

- draw up the questions
- ask the questions
- tally the results
- present the results

b. Data can be recorded by using tally marks.
This is how you record the items:

c. When doing a simple survey, tally each person's answers:

| | | |
|---|---|---|
| **Yellow** | 𝍸 | **4** |
| **Red** | 𝍸 | **5** |
| **Blue** | 𝍸 \| | **6** |
| **Green** | \| | **1** |
| **Pink** | 𝍸 | **4** |

Order the data from largest to smallest or the other way around. So blue has the most with 6, then red with 5, followed by pink and yellow with 4 each and lastly green with 1.

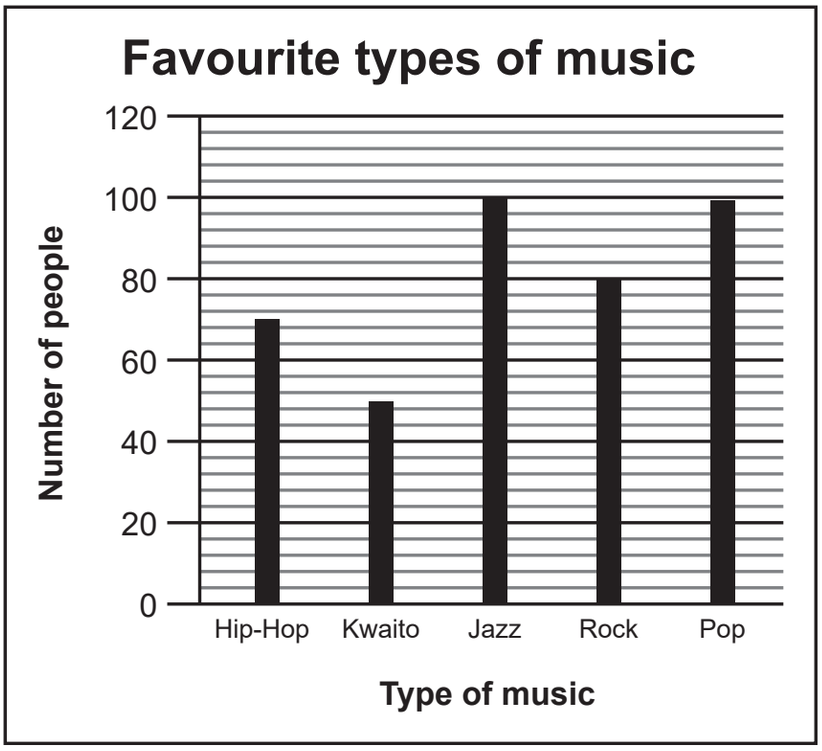
## Types of graphs

1. **Pictograph: many-to-one**
   This type of graph uses images to represent what is being compared. This is a pictograph as one picture of an apple represents 10 apples.

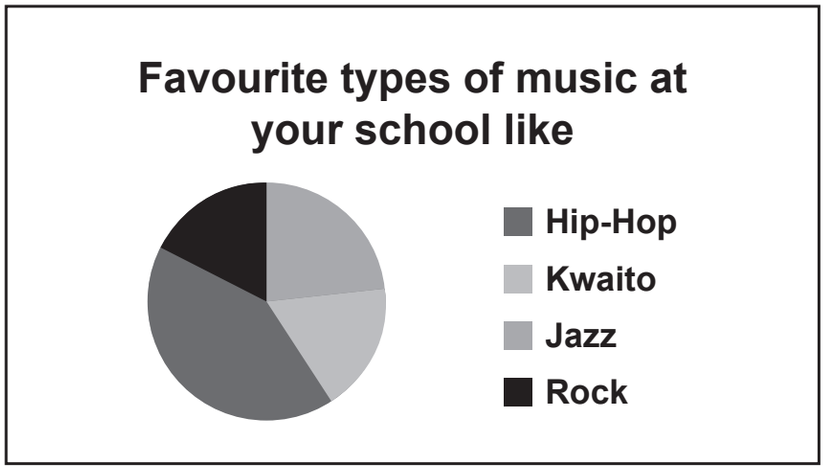
| **Apples picked at Jozi Farm** | |
|---|---|
| **Months** | = 10 apples |
| **January** | 🍎🍎🍎🍎🍎🍎🍎🍎 |
| **February** | 🍎🍎🍎🍎🍎🍎 |
| **March** | 🍎🍎🍎 |
| **April** | 🍎🍎🍎 |

**2. Bar graph**

Information in this type of graph is presented in columns either vertically or horizontally.




**3. Pie graphs**




Each slice is a fraction of the whole.

Each slice represents what percentage or fraction of people like each type of music.

## Analyse and Interpret Data

1. Useful questions to analyse data:

   Ask learners questions such as:

   - What pattern do you see?
   - What does this graph tell you?
   - Who could use this data?
   - Why is this data shown in a …graph?
   - What is being compared?
   - What is the relationship between the data sets?
   - Why do you think there is a relationship?
   - What conclusions can be drawn about the data? Why?

2. Tips for learners to analyse data or creating graphs of their own.
   - Is my data source valid?
   - What are the different categories of data?
   - What problem am I trying to solve?
   - What is the mode? (the most frequently occurring item in the data set)

3. Look at pie, bar and pictographs (many-to-one) and analyse the information given.

## Data sources and context

It is best to look at something in your local community.

Perhaps different places children play, games they play, birthday months in a class/grade, favourite TV programmes, sources of water, transport used by children, favourite books, temperature over a given period and so on.

### Drawing pictographs

This is recommended as a project.

Go through the whole data cycle: stating a problem, collecting and recording data, ordering the data, representing the data in a pictopraph, analyzing and interpreting the data.

Show learners the conventions.

- Title.
- Labels of items being measured.
- Suitable icons for the graph.
- Key to show how much each icon represents.
- Clear sub-headings.

# TOPIC 8: PROPERTIES OF 2D SHAPES

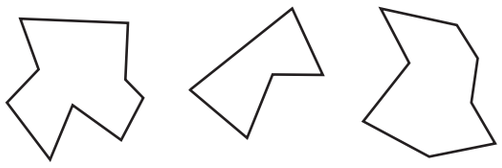
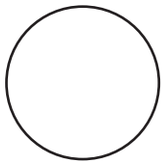
## INTRODUCTION

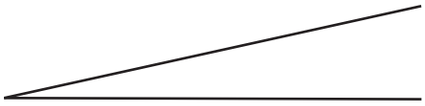
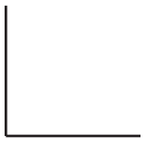
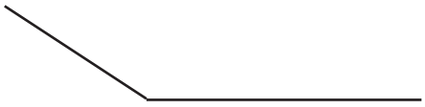
- This unit is 7 hours.
- Properties of 2D Shapes, is part of the content area 'Shape and Space'. This counts for 15% of the final exam.
- The unit covers the concept of 2D shapes, which form the basis of geometry. Learners need to understand the characteristics of the shapes and be able to distinguish and link them.

## SEQUENTIAL TEACHING TABLE

| GRADE 4<br>FOUNDATION PHASE | GRADE 5<br>INTERMEDIATE PHASE | GRADE 6<br>INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Range of 2D shapes includes: circles, squares, and rectangles, regular and irregular polygons, triangles, pentagons and hexagons<br>• Recognise, visualise and name 2D shapes in the environment and in geometric settings<br>• Describe, sort and compare properties of 2D shapes in terms of straight and curved sides and the number of sides | • Range of 2D shapes includes: circles, squares, rectangles, regular and irregular polygons, triangles, pentagons, hexagons and heptagons<br>• Identify and name regular and irregular 2D shapes in the environment and in geometric settings<br>• Describe and create 2D shapes with straight and curved sides. Determine the number and length of sides, angles in shapes, [right angles, acute angles and obtuse angles] | • Range of 2D shapes expands to include: parallelograms and octagons in addition to circles, squares, rectangles, regular and irregular polygons, triangles, pentagons, hexagons and heptagons<br>• Identify similarities and differences between rectangles and parallelograms<br>• Range of angles expands to include straight- and reflex angles and a revolution in addition to right angles, acute angles and obtuse angles<br>• Draw circles using compasses and create patterns with circles |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **2D shapes** | 2D objects are closed shapes which consist of more than one line and exist on a plane. A square on paper is a 2D shape. |
| **Line** | In geometry a line:<br>• can be either straight or curved<br>• has no thickness.<br>• a straight line extends in both directions without end. |
| **Regular Shapes** | A regular shape means that all the angles are equal in size and all the sides are of equal length.<br>  |
| **Irregular Shapes** | An irregular shape is made up of polygons which do not have equal sides and where the angles are not equal.<br>  |
| **Polygons** | 2D shape that has at least 3 straight sides such as a triangle, quadrilateral etc. |
| **Triangle** | Three sided figure in two dimensions on a plane |
| **Quadrilateral** | Four sided figure in two dimensions on a plane |
| **Square** | Four sided figure with right angles and all 4 sides are equal in length |
| **Rectangle** | Four sided figure with right angles and two pairs of opposite sides equal in length |
| **Pentagon** | Five sided figure in two dimensions on a plane |
| **Hexagon** | Six sided figure in two dimensions on a plane |
| **Heptagon** | Seven sided figure in two dimensions on a plane |
| **Circles** | A circle is a type of line that encloses an area with a central point which is at an equal distance from all points on the circle.<br>  |

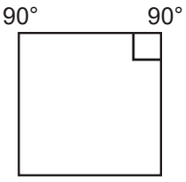
| Term | Explanation / Diagram |
|---|---|
| **Acute Angles** | Less than 90°<br>  |
| **Right angle** | A 90° angle. Two lines which join at a perpendicular angle<br>  |
| **Obtuse angles** | More than 90°<br>  |
| **Revolution** | A circle or 360°. for example, when the long hand of a clock moves from 12 all the way around until it reaches 12 again, it has made a full rotation, or a revolution. |

# SUMMARY OF KEY CONCEPTS

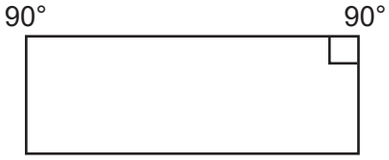
## Similarities and differences between a square and a rectangle

Please refer to the Grade 4 Content booklet for a complete list of 2-D shapes.

1. **Properties of quadrilaterals:**
   Four sides (edges)
   Four vertices (corners)
   The interior angles add up to 360 degrees
2. **Squares and Rectangles**



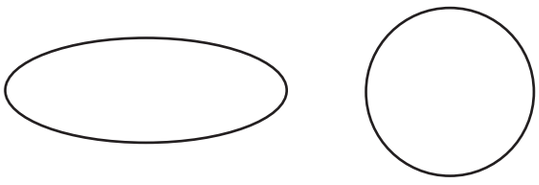

- A square has 4 right angles.
- A square has 4 equal sides.
- A square has two sets of parallel lines.
- The angles of a square add up to 360°.



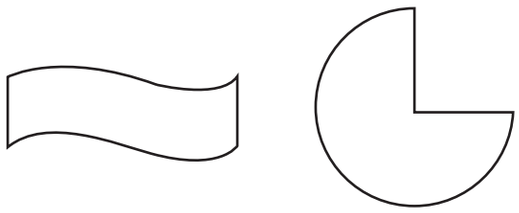

- A rectangle has 4 right angles.
- A rectangle has two pairs of equal sides.
- A rectangle has two sets of parallel lines.
- The angles of a rectangle add up to 360°.

## Characteristics that distinguish shapes

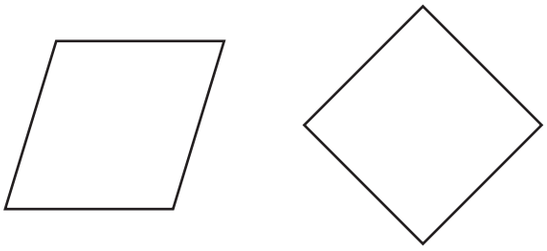
Closed shapes with curved lines:



Closed shapes with straight and curved sides:



Closed shapes with straight lines only:

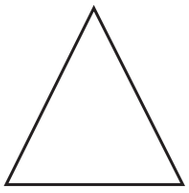


## Characteristics used to describe, distinguish, sort and compare polygons:

**Polygons:**

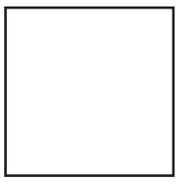
These are closed 2-Dimensional shapes on a plane with at least three straight sides. Shapes are all grouped as polygons and they are subdivided into various other groups.

1. **Triangle: 3 sided shape**



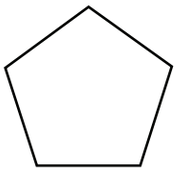
2. **Quadrilateral: 4 sided shape**

    a. Square

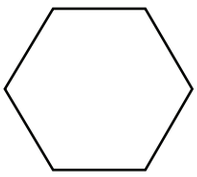


b. Rectangle

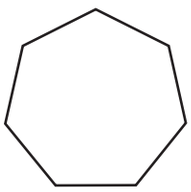
3. **Pentagon: 5 sided shape**



4. **Hexagon: 6 sided shape**



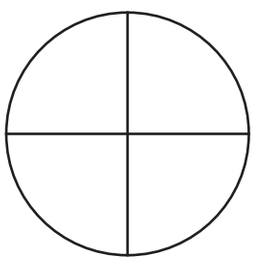
5. **Heptagon: 7 sided shape**



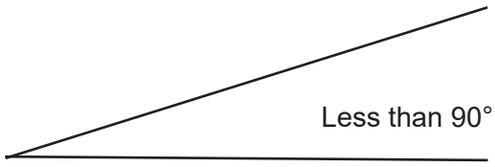
## Angles

The amount of turning between two arms coming from the same point.

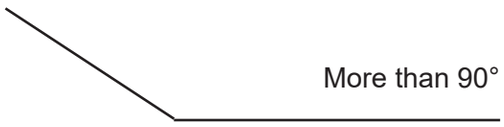
1. A right angle is a quarter of a turn of a full revolution
   90° + 90° + 90° + 90° = 360°



2. Recognise angles less than 90°.

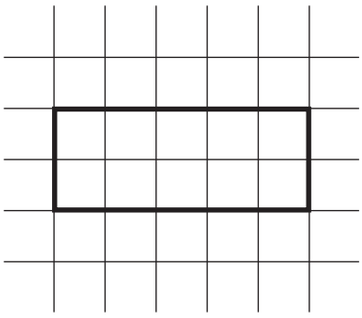



3. Recognise angles more than 90°.



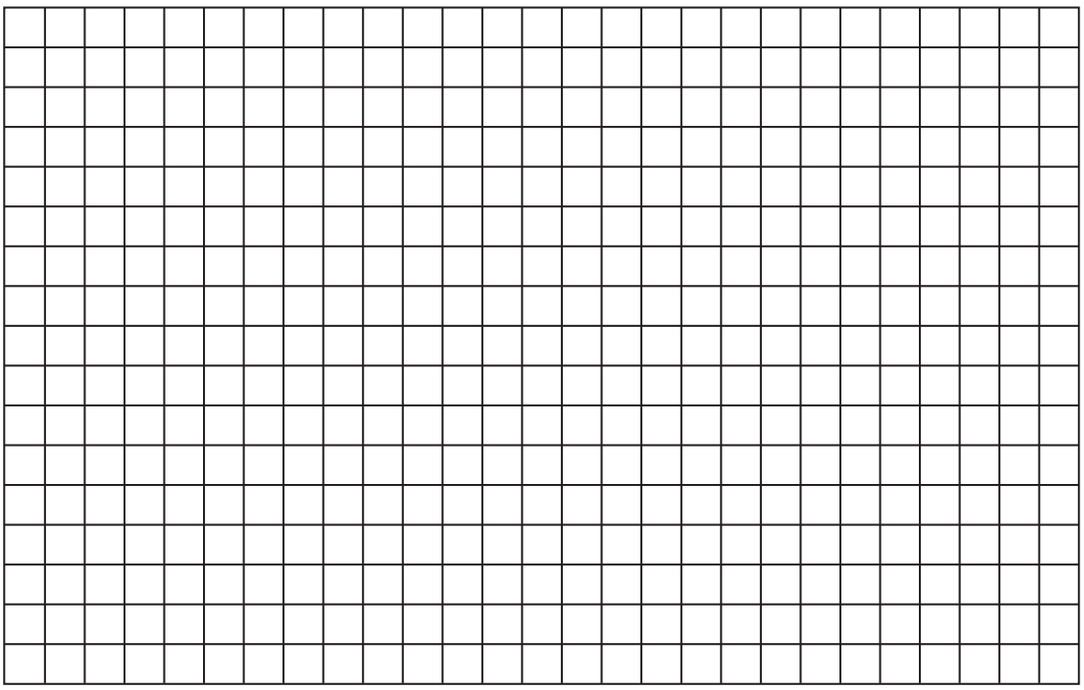

## Draw shapes on grid or dot paper.

Various shapes can be drawn using a sharp pencil and a straight edge like a ruler.

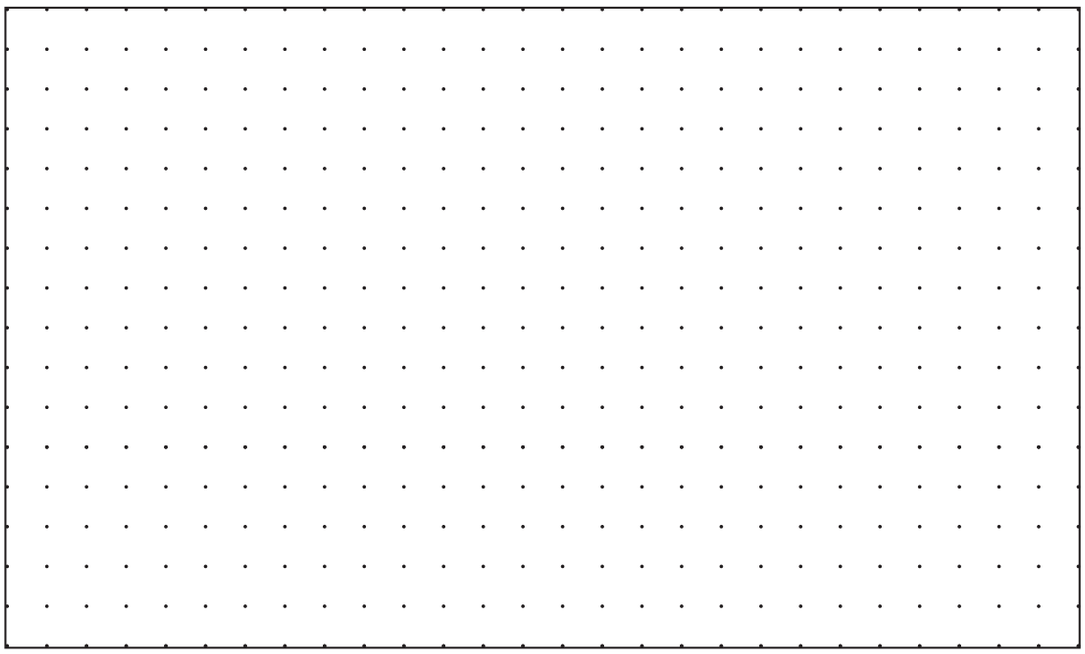


# RESOURCES

## GRID PAPER



## DOT PAPER



# TOPIC 9: MEASUREMENT – CAPACITY AND VOLUME

## INTRODUCTION

- This unit runs for 5 hours.
- This unit falls under the content area 'Measurement' and it counts for 15% of the final exam.
- The unit covers Volume and Capacity. Learners need to understand how to measure using litres and millilitres and carry out calculations.
- Conversions from litres to millilitres are introduced.
- The purpose of this section is to develop measuring skills and calculation using volume and capacity. New concepts and vocabulary are introduced.

## SEQUENTIAL TEACHING TABLE

| GRADE 3<br>FOUNDATION PHASE | GRADE 4<br>INTERMEDIATE PHASE | GRADE 5<br>INTERMEDIATE PHASE |
|---|---|---|
| LOOKING BACK | CURRENT | LOOKING FORWARD |
| • Measure in non-standard and informal units<br>• Get a basic sense of how much litres and millilitres are<br>• Start measuring with marked cups and spoons<br>• Reading measuring jugs on the lines that are numbered<br>• Find capacity/volume by packing or filling containers<br>• Compare volume and capacity with words "more" and "less" | • Use formal, standard measuring instruments e.g., measuring cups, -jugs and medicine teaspoons to measure volume<br>• Get an exact idea of the units litre and millilitre and the ratio of these units (1:1000)<br>• Start converting between units<br>• Read measuring jugs on and between the numbered calibration lines<br>• Compare different volumes or capacities in numerical terms up to four digits<br>• Understand the terms "volume" and "capacity" as well as the relationship between the two concepts | Capacity and volume is not included in Term 3's schedule for Grade 5, however, the progression from Grade 4 is as follows:<br>• Develop an understanding of why the volume of rectangular prisms is given by length multiplied by width, multiplied by height<br>• Learn the unit kilolitre in addition to litre and millilitre, as well as its relation to litre (1:1000)<br>• Convert between units through formal calculations |

# GLOSSARY OF TERMS

| Term | Explanation / Diagram |
|---|---|
| **3D** | A 3D shape is an object that has height, width and depth, like any object in the real world and which takes up volume in space.. |
| **Measuring instruments** | Teaspoons, jugs, bottles are examples of measuring instruments in the home. To be accurate, measuring instruments show markings (e.g. beakers or measuring tubes in a lab). Cold-drink bottles and milk bottles show capacity. |
| **Units SI units** | This stands for "System International", which is an international system of standard (same) measures to make sure all people all over the world mean the same thing when they talk of or measure a metre for example, or a litre, or a kilogram. |
| **Millilitre and litre** | We use millilitre (ml) to measure small amounts of liquid e.g. amount of medicine to give a child.<br>We use litre (l) to measure larger amounts of liquid e.g. a kettle |
| **Conversion** | This is moving from one form of measuring to another. In Grade 5 we use litres and convert to millilitres or use millilitres and convert to litres. |
| **Calibration** | This is a system that aids in accuracy when measuring so that a measuring instrument that measures a certain volume at different places on earth, measure it exactly the same.. |
| **Volume** | This is the amount of space that an object takes up. |
| **Capacity** | This is the amount of a substance that an object can hold or the amount of space inside an object. |
| **Gradation lines** | Numbered intervals on a measuring instrument |

# SUMMARY OF KEY CONCEPTS

## Litres and Millilitres

1. Basic conversions
   1 $l$ = 1 000 $ml$
   1 000 $ml$ = 1 $l$

   $\frac{1}{2}$ $l$ = 500 $ml$

   $\frac{1}{4}$ $l$ = 250 $ml$

   $\frac{1}{5}$ $l$ = 200 $ml$

   $\frac{1}{10}$ $l$ = 100 $ml$

   1000$ml$ ÷ 2 = 500 $ml$
   1000$ml$ ÷ 4 = 250 $ml$
   1000$ml$ ÷ 5 = 200 $ml$
   1000$ml$ ÷ 10 = 100 $ml$

2. It is important for learners to be familiar with everyday items such as teaspoons, spoons, cups, jugs and bottles such as milk cartons. If possible, gather as many different kinds as you can and allow the learners to work with these.

**Example:** See how many medicine teaspoons you need to fill a 500 $ml$ bottle of cool drink.

## Reading Scale Accurately

1. When measuring an amount of liquid in a measuring jug or beaker, take care to read the amount correctly.
2. To do this, the eye must be at the same level as the top of the liquid.
3. Take care to understand the scale on the measuring cylinder. Sometimes not all spaces are marked. The litre may be marked and have unmarked lines below this.
4. Look at how many marks there are and calculate what each interval stands for.
5. This will give you the amount at each mark.

| | |
|---|---|
| 1000 $ml$ | 1 $l$ |
| 750 $ml$ | |
| 500 $ml$ | |
| 250 $ml$ | |

In the example above there are 4 divisions so: 1000 $ml$ ÷ 4 = 250 $ml$

This means that each space stands for 250 $ml$

**Rounding off**

Rounding off to the nearest 100 $ml$ or 1 000 $ml$ – refer to rounding off in whole numbers as the same principle applies.

## Conversions ml and l

Use the following to convert:

1 $l$ = 1 000 $ml$

1 000 $ml$ = 1 $l$

1. Converting litres to millilitres
   9 $l$ to $ml$
   = 9 $l$ = 9 000 $ml$ (9 x 1 000 $ml$)
2. Converting litres and millilitres to millilitres
   2$l$ 453 $ml$
   = 2 453 $ml$

Converting fractions of a litre to millilitres

$\frac{1}{2}$ $l$ = 500 $ml$ 1 000 ÷ 2 = 500

$\frac{1}{4}$ $l$ = 250 $ml$ 1 000 ÷ 4 = 250

$\frac{1}{5}$ $l$ = 200 $ml$

$\frac{1}{10}$ $l$ = 100 $ml$

4. Converting millilitres to litres and millilitres
   1 250 $ml$ = 1$l$ 250 $ml$
5. Converting to a fraction of a litre
   6 500 $ml$ = $6\frac{1}{2}\,l$
6. Converting to litres as fractions to millilitres
   $3\frac{1}{2}\,l$ = 3 500 $ml$
7. Conversions are used to compare capacities.
   $6\frac{1}{2}\,l$ * 6 500 $ml$

   $6\frac{1}{2}\,l$ = 6 500 $ml$

   $3\frac{1}{4}\,l$ * 3 300 $ml$

   $3\frac{1}{4}\,l$ < 3 300 $ml$

8. Conversions are used for ascending and descending order.
   1 l 350 $ml$; 1475 $ml$; $1\frac{1}{2}\,l$; 1, 450 $l$
   Ascending: 1 $l$ 350 $ml$; 1, 450 $l$; 1475 $ml$; $1\frac{1}{2}\,l$;
   Descending: $1\frac{1}{2}\,l$ ; 1475 $ml$; 1, 450 $l$; 1 $l$ 350 $ml$

## Calculations with Capacity

Convert before calculating, if necessary:

1. 250 $ml$ + 1 457 $ml$ = ___

   250
   + 1 457

2. 4 $l$ + 25 $l$ = ___

3. 346 $ml$ + 1 $l$ 647 $ml$

   Convert to $ml$ first

   346
   + 1 647

4. $\frac{5}{8}$ $ml$ + $\frac{2}{8}$ $ml$

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

5. 48 $ml$ x 7 = ___ $ml$

   48
   x 7

6. 925 $ml$ ÷ 5 = ___ $ml$

   $5\overline{)925}$

# RESOURCES

| | |
|---|---|
| Teaspoon (tsp) | 5 $ml$ |
| Tablespoon (Tbsp) | 15 $ml$ |
| $\frac{1}{2}$ Cup | 125 $ml$ |
| 1 Cup | 250 $ml$ |
| $\frac{1}{4}$ $l$ | 1 Cup |
| $\frac{1}{2}$ $l$ | 500 $ml$ |
| $\frac{3}{4}$ $l$ | 750 $ml$ |
| 1 $l$ | 1000 $ml$ |

# Notes