# Mathematics 

## Year 1

## Teacher Guide

This book was developed with the participation of the Department of Basic Education of South Africa (D
BE) using the DBE State-owned (Sasol Inzalo)

## YEAR 1

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## TERM

## UNIT 1

## 1 WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

### 1.1 Number names and number symbols

1. How many cylinders are shown below? Write your answer in words e.g. twelve.

Twenty six


Eighteen is called a number name. The number name eighteen means ten and eight.
2. What does the number name fifteen mean? Ten and five/ 1 ten and 5 ones
3. What does the number name forty-four mean? Forty and four/ 4 tens and 4 ones

We can also represent eighteen using symbols as illustrated below:


The 8 sits on top of the 0 , as shown above.
The number eighteen has two parts: ten and eight.
When you write 18 as $10+8$, you are using expanded notation.

4. What are the parts of thirty-six?
5. What is the number symbol for thirty-six?
6. Write thirty-six in expanded notation. 3 tens and 6 ones

## 36

$30+6$

### 1.2 Count in hundreds, tens and ones

1. How many cubes are there in total?

Match the place value cards with the base ten blocks.


Four hundred and seventy-six cubes are shown below.
$10 \times$ cubes (ones) piled together (on top of the other) form a Ten, which is like a rod in shape. $10 \times$ Tens piled together (one next to the other) form a Hundred, which is flat in shape.

Four hundred and seventy-six cubes are shown below.


6 ones or 6
The number four hundred and seventy-six has three parts. The three parts are:

| Four hundreds | 400 | This is the hundreds part |
| :--- | :---: | :--- |
| Seventy | 70 | This is the tens part |
| Six | 6 | This is the ones part |

The three parts can be combined to form the number symbol 476.


In the number symbol 476, the 00 of the 400 is hidden behind the 76 , and the 0 of the 70 is hidden behind
2. Use the given diagram to complete the table below it.


| Number in words | Numerical value | Place value parts |
| :--- | :---: | :--- |
| Three hundred | 300 | hundreds |
| Forty | 40 | tens |
| Five | 5 | ones |

3. Which number has the parts that are shown below?

80
(a) Write the number name.
(b) Write the number symbol.
(c) Write the number in expanded notation. $500+80+6$
4. Which number has the parts 900 and 8 Nine hundred and eight

### 1.3 Building up and breaking down of numbers

The numbers 50 and 4 can be combined to form the single number 54 .


The number 54 can also be formed by combining two other numbers, for example 34 and 20.


54 can be formed by combining two other numbers, for example in many more ways: $35+19=54$

$$
28+26=54 \quad 38+16=54
$$

1. Write down other three different ways in which 54 can be formed by combining two numbers.

$$
34+20=54 \quad 45+9=54
$$

$$
27+27=54
$$

[Any suitable answer]
2. Given the digits:


## 2

(a) Use each digit once. Make the smallest 3-digit number.
(b) Use each digit once. Make the largest 3-digit number.
(c) You can use a digit twice. Make the smallest 3-digit number. 226
(d) You can use a digit twice. Make the largest 3-digit number.
3. Given the number 537
(a) Which digits do you need to build 537 ?
(b) What other numbers can you build with the same digits?

753; 735; 573; 373; 357
(c) What is the biggest number from (b) above?
(d) What is the smallest number from (b) above?

### 1.4 Expanded notation

The expanded notation for 465 is $400+60+5$. The 4 , the 6 and the 5 in the number symbol 465 are called digits.

- The digit 4 in the number symbol 465 means 400 or 4 hundreds or 40 tens
- The digit 6 in the number symbol 465 means 60 or 6 tens
- The digit 5 in the number symbol 465 means 5 ones
- $465=4$ hundreds +6 tens +5 ones

| Hundreds | Tens | Ones |
| :---: | :---: | :---: |
| 4 | 6 | 5 |

- $465=400+60+5$

NB: The value or meaning of a digit in a number symbol depends on the position or place of the digit in the number symbol

1. Which digit is in the tens place in the number symbol 384 ? 8
2. Which digit in the symbol 384 represents the number 300 ? 3
3. The digit in the hundreds place in 243 is 2 .
(a) Which digit is in the tens place in 243 ?

4
(b) Which digit is in the tens place in 283 ?
4. The expanded notation for some numbers is given below. Write the number symbols for these numbers.
(a) $20+6$ 26
(b) $5+40$ 45
(c) $200+6$ 206
(d) $700+50+8$ 758
(e) $70+300+6$ 376
5. Complete this statement for the number two hundred and eighty-three:

2 hundreds $+\underline{8}$ tens +3 ones
6. Write the number symbol for two hundred and eighty-three.

283
7. Write the expanded notation for the number two hundred and eighty-three.
$200+80+3$
8. Write the number name for 836 .
9. Write 836 in expanded notation.

Eight hundred and thirty six
$800+30+6$
10. Write down the place value parts that make up the number 836

8 hundreds +3 tens +6 units
11. Answer the following:
(a) How do you know that the " 7 " in 573 means 70 , and not 7 or 700 ? 7 tens $=70$
(b) How do you know that the " 7 " in 357 means 7 , and not 70 or 700 ? 7 ones $=7$
(c) How do you know that the " 7 " in 735 means 700 , and not 7 or 70 ? 7 hundreds $=700$

### 1.5 Represent, order and compare numbers

1. Count in thirties from 450 until you reach 900 . Write down the number symbols as you go along.

450; 480; 510; 540; 570; 600; 630; 660; 690; 720; 750; 780; 810; 840; 870

The pictures alongside show which animals are bigger. We can also decide which number(s) is/ are bigger than the other when given two or more numbers with the same digits by looking at the place value of the digits. To compare numbers, we use the symbol "" for greater than, " $<$ " for less than and " =" for equal to.

## Example:

653 and 676 have 3 digits. The hundreds digits are
 the same but the tens digit is different. 70 is bigger than 50 , therefore 653 is less than 676 or 676 is bigger than 653 . We represent the numbers as $653<676$

Notice that the open part of the sign is always towards the bigger number.
2. In each case, compare the numbers using the symbol $>$ or $<$ in the place of "and."
(a) $498<902$
(b) $676<687$
(c) $291>289$
(d) $653>635$
3. Arrange these numbers from biggest to smallest.
(a) $810 ; 775 ; 309 ; 899 ; 785 ; 459$; 293
899; 810; 785; 775; 459; 309;293
(b) 479; 989; 201; 609; 183; 685; 107
989; 685; 609; 479; 201; 183; 107

## UNIT 2

## NUMBER SENTENCES

### 2.1 Open and closed number sentences

When you add 30 to 50 you get the same answer as when you add 50 to 30 . In other words, $50+30=30+50$, we call this a number sentence. We have two types of number sentences, closed and open number sentences.

## Closed number sentences

A closed number sentence gives all the information about the numbers, and it is always true or false.

$$
\begin{aligned}
& 5+3=8 \\
& 78-65=13 \\
& 9 \div 3=3 \\
& 7 \times 12=84
\end{aligned}
$$

1. Say whether the following number sentences are true or false.

Example: $5+3=6+4$ is false.
(a) $8+6=7+7$
(b) $2+9=9+2$
(c) $70+50=80+60$
(d) $13-7=14-9$
(e) $13-7=20-14$

True
True
False
False
True

## Open number sentences

An open number sentence does not give all the information about the numbers. Missing information has to be determined to make the number sentence true
■ $+7=15$,
$\therefore$ ■ $=8$
$16-9=\square, \quad \therefore ■=7$
$36 \div 12=\square, \quad \therefore \square=3$
$12 \times ■=60$,
$\therefore ■=5$
2. In each case, find the number that will make the number sentence true.
(a) $7+3=5+5$
(b) $7 \times 9=10+53$
(c) $700+300=800+200$
(d) $80+50=80+20+30$
(e) $75+25=100$
(f) $500+500=1000$
(g) $120+80=150+50$
(h) $250+750=1000$
(i) $487+13=500$
3. Write number sentences for the following:
(a) The sum of 7 and 5 is equal to the sum of 9 and $3.7+5=9+3$
(b) Ben picked 50 mangoes. Later he picked 30 more mangoes. How many mangoes did he pick altogether?
$50+30=$
(c) A teacher places 65 books onto the shelves. Each shelf holds 5 books. How many shelves does the teacher fill?
$65 \div 5=$
(d) Themba has 4 dogs. He gave each dog 4 dog cakes. How many dog cakes did he give altogether?
$4 \times 4=$

### 2.2 Properties of Whole Numbers

## Commutative Property

When you add or multiply numbers, the order does not count, as the answer will always remain the same.

$$
\begin{aligned}
& 50+30=30+50 \\
& 15 \times 5=5 \times 15
\end{aligned}
$$

1. Which of these number sentences are false?
(a) $500+300=300+500$

True
(b) $500-200=200-500$

False
(c) $20 \div 5=5 \div 20$

False
(d) $11 \times 2=2 \times 11$

True

## Associative Property

You can add or multiply numbers regardless of how the numbers are grouped, the answer will be the same.

$$
\begin{aligned}
& (12+3)+8=12+(3+8) \\
& 7 \times(5 \times 9)=(7 \times 5) \times 9
\end{aligned}
$$

2. Which of these number sentences are false?
(a) $(1+3)+(5+7)+9=1+(3+5)+(7+9) \quad$ True
(b) $(10+8)+6=10+(8+6)$
(c) $(10+8)-6=10+(8-6)$
(d) $(10+8)-6=(6+6)-8$
(e) $11 \times(2 \times 5)=(11 \times 2) \times 5$
(f) $(60+3)+7=60+(3+7)$

## Identity Element of Zero

If you add or subtract 0 from any number, the number will always remain the same.

$$
\begin{aligned}
& 16+0=16 \\
& 16-0=16
\end{aligned}
$$

Adding and subtracting the same number to a number, does not change the value of the number.

$$
14+4-4=14
$$

3. Complete the following number sentences
(a) $6+0=6$
(b) $6-0=6$
(c) $27+0=27$
(d) $27-0=27$
(e) $17+2-2=17$
(f) $464+6-6=464$
(g) $85-85=0$
(h) $862-862=0$

### 2.3 Inverse operations

## Addition and subtraction as inverse operations

The inverse of addition is subtraction. This means subtraction is the opposite of addition. This means we can check an addition calculation by subtraction or a subtraction calculation by addition.

## Example:

If $96+48=144$, then $144-48=96$
If $144-48=96$, then $96+48=144$

1. Fill in the missing number.
(a) If $345+40=385$; then $385-40=345$
(b) If $345+40=385$; then $385-345=40$
(c) If $345+40=385$; then $385-345=40$

## Multiplication and divisions as inverse operations

It is important to understand that any division statement can be changed into a multiplication statement.

## Example:

$48 \div 8=6$ can be changed into $6 \times 8=48$ or $8 \times 6=48$.
$5 \times 7=35$ can be changed to $35 \div 5=7$ or $37 \div 5=7$
2. Use the information given to fill in each box.
(a) $4 \times 25=100$, then $100 \div 25=4$
(b) $12 \times 11=132$, then $132 \div 11=12$
(c) $225 \div 5=45$, then $45 \times 5=225$
(d) $171 \div 9=81$, then $81 \times 9=171$
(e) $28 \times 12=336$, then $336 \div 28=12$

## UNIT 3

## NUMERIC AND GEOMETRIC PATTERNS

### 3.1 Investigate and extend geometric patterns

## Geometric patterns with a constant difference

A geometric pattern is the arrangement of objects, shapes, drawings, diagrams in the same manner without changing the structure. However, the structure may be enlarged or reduced.


Figure 1


Figure 2


Figure 3


Figure 4

One can describe the pattern above by saying two dots are added diagonally on the either side of the yellow circle throughout the pattern.

1. In the following geometric patterns, draw figure 4 and then describe how you would extend the pattern.

(d)

## Numeric patterns with a constant difference

A numeric pattern is a list of numbers that follow a certain sequence or pattern. This pattern generally establishes a common relationship or rule between all the numbers.

Example: 2; 4; 6; 8; 10; 12; 14; 16; ...
We can describe the pattern by saying we always add 2 to the previous number to get the next number.
2. Complete the following patterns by adding the next three numbers and describe how the pattern extends, [any suitable answer]
(a) $6 ; 9 ; 12 ; 15 ; 18 ; 21 ; 24 ; 27 ; 30$

Add 3 to the previous number to get the next number
(b) $5 ; 10 ; 15 ; 20 ; 25 ; 30 ; 35 ; 40 ; 45 ; 50$

Add 5 to the previous number to get the next number
(c) $7 ; 11 ; 15 ; 19 ; 23 ; 27 ; 31 ; 35 ; 39 ; 43$

Add 4 to the previous number to get the next number
(d) $9,18,27,36,45,54,63,72 ; 81 ; 90$

Add 9 to the previous number to get the next number
(e) $10 ; 20 ; 30 ; 40 ; 50 ; 60 ; 70 ; 80 ; 90$

Add 10 to the previous number to get the next number
(f) $1 ; 4 ; 7 ; 10 ; 13 ; 16 ; 19 ; 22 ; 25$

Add 3 to the previous number to get the next number
(g) 275; 273; 271; $268 ; 265 ; 262$

Subtract 2 to the previous number to get the next number
(h) $191 ; 195 ; 199 ; 203 ; 207 ; 210$

Add 4 to the previous number to get the next number

### 3.2 Input and output values

## Flow diagrams

Patterns can be represented using a flow diagram. Flow diagrams are made up of small boxes with inputs and outputs linked with arrows. Between the input and the output is the rule.

## Example:



1. Complete the following flow diagrams using the given rule.

| (a) | $\begin{aligned} 8-3 & =5 \\ 12-3 & =9 \\ 16-3 & =13 \\ 20-3 & =17 \end{aligned}$ | (b) | $\begin{array}{r} 3+7=10 \\ 6+7=13 \\ 12+7=19 \\ 15+7=22 \end{array}$ |
| :---: | :---: | :---: | :---: |



## Patterns represented in tables

Patterns can also be represented using tables. The first row of a table displays input values and the bottom row(s) display(s) output numbers. The rule is used to generate the output values.

## Examples:

Using tables is a useful way to record patterns.

|  | 1 | Input |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| $\times 6$ | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |


| $\mathbf{X}$ | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| $\mathbf{2}$ | 2 |  | 6 | 8 | 10 | 12 | 14 | 16 |  | 20 |
| 3 | 3 | 6 | 9 | 12 | 15 |  | 21 | 24 | 27 | 30 |
| 4 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 5 |  | 10 | 15 | 20 | 25 | 30 | 35 |  | 45 | 50 |
| 6 | 6 | 12 | 18 | 24 |  |  | 42 | 48 | 54 |  |
| 7 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |
| 8 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 |  | 80 |
| 9 | 9 | 18 |  | 36 | 45 | 54 | 63 | 72 | 81 | 90 |
| $\mathbf{1 0}$ | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Outputs

1. Complete the following tables using the given rules.
(a)

|  | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ | $\mathbf{7}$ | $\mathbf{8}$ | $\mathbf{9}$ | $\mathbf{1 0}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\times \mathbf{5}$ | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |

(b)

|  | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ |  | $\mathbf{8}$ | $\mathbf{9}$ | $\mathbf{1 0}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\times \mathbf{2}+\mathbf{1 0}$ | 12 | 14 | 16 | 29 | 20 |  | 26 | 28 | 30 |

2. Here is part of the multiplication table.

| $\times$ | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ | $\mathbf{7}$ | $\mathbf{8}$ | $\mathbf{9}$ | $\mathbf{1 0}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| $\mathbf{2}$ | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| $\mathbf{3}$ | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| $\mathbf{4}$ | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| $\mathbf{5}$ | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| $\mathbf{6}$ | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| $\mathbf{7}$ | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 |

(a) Complete the table.
(b) Which method did you use to complete the table?

Multiplied column numbers with the corresponding row numbers (c) What patterns do you see in the table?

Multiples of numbers
3. Use the following table to determine answers.

| $\mathbf{x}$ | $\mathbf{1 2}$ | $\mathbf{1 4}$ | $\mathbf{1 6}$ | $\mathbf{1 8}$ | $\mathbf{2 0}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :--- | :--- |
| $\mathbf{1 2}$ | 144 | 168 | 192 | 216 | 240 |  |
| $\mathbf{1 4}$ | 168 | 196 | 224 | 252 | 280 |  |
| $\mathbf{1 6}$ | 192 | 224 | 256 | 288 | 320 |  |
| $\mathbf{1 8}$ | 216 | 252 | 288 | 324 | 360 |  |
| $\mathbf{2 0}$ | 240 | 280 | 320 | 360 | 400 | (b) $18 \times 18=324$ |
|  | (c) $16 \times 12=192$ |  |  |  |  |  |
|  | (d) $20 \times 20=400$ |  |  |  |  |  |
|  | (e) $14 \times 16=256$ |  |  |  |  |  |

### 3.3 Equivalent forms and describing patterns

## Different representation of a pattern

When patterns of different forms give the same results, we say they are equivalent forms of patterns. Different forms of patterns can be presented in tables, flow diagrams, diagrams and verbally.

## Example:

| Flow diagram | Table |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\underset{\substack{\text { Input numbers } \\ \text { Postition no. }}}{ } \quad$ Output numbers |  |  |  |  |  |  |  |  |  |
|  | Position number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 |
| , | $\times 6$ | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 54 |
| Number sentence |  |  |  | Verb | ally |  |  |  |  |
| Input $\times 6=$ output | Multiply the pos <br> number |  |  |  |  |  |  |  |  |

## Describing a pattern

Patterns can be described in different ways. There is a horizontal and vertical description. A horizontal description indicates how one gets the next term from the previous term in the output values. A vertical description (general rule) indicates the relationship between the input and the output values The first term in a numeric pattern not represented in table form is always regarded as the output value of the first input value (i.e. input value is 1 )

1. Study the following two tables and two flow diagrams.

## Table A

| Input numbers | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Output numbers | 4 | 8 | 12 | 16 | 20 | 24 |

## Table B

| Input numbers | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Output numbers | 5 | 9 | 13 | 17 | 21 | 25 |

Flow Diagram A

(a) Which table is equivalent to which flow diagram (i.e. gives the same output numbers for the same input numbers)?

Table $A$ is equivalent to flow diagram $B$
Table $B$ is equivalent to flow diagram $A$
(b) Calculate all the missing numbers in each table.
(c) Write any number sentence to represent each table

Table A. $4 \times$ input $=$ output
Table B $\quad 4 \times$ input $+1=$ output
(d) Describe how to get the next term in each table and write down the general rule in own words

Table A : Add 4 to the previous term to get the next term (description) Multiply the input by 4 to get the output (general rule)

Table B: Add 4 to the previous term to get the next term (description) Multiply the input by 4 and add 1 to get the output. (general rule)

## UNIT 4

## WHOLE NUMBERS: ADDITION AND SUBTRACTION

### 4.1 Rounding off to estimate answers

It is often useful to quickly estimate answers of calculations. Imagine you want to buy items for R28 and R53 and do not have time to accurately add R28 and R53. It can help you to know that you need to pay about (approximately) R30 + R50

- 53 can be rounded off to the nearest multiple of 10 , which is 50 .

- 28 can be rounded off to the nearest multiple of ten, which is 30 .

- 25 is equally far from 20 and 30 . People all over the world have agreed to round off "upwards" in a case like this, so 25 is normally rounded off to 30.


1. In each case, estimate the answers by rounding off to the nearest ten
(a) $43+52 \approx 40+50 \approx 90$
(b) $46+57 \approx 50+60 \approx 110$
(c) $74-35 \approx 70-40 \approx 30$
2. In each case round off to the nearest hundred to calculate the following:
(a) $267+466 \approx 300+500 \approx 800$
(b) $932-437 \approx 900-400 \approx 500$

Rounding off can be used to estimate the answers for calculations.

## Example:

A traveller has driven 268 kilometres of the 859 kilometres to his destination. Approximately, how far does he still have to drive?
268 and 859 rounded off to the nearest hundred are 300 and 900.
The traveller still has to drive approximately ( $\approx$ ) $900-300$ kilometres, $\approx 600$ kilometres.
3. Round off to the nearest hundred before you calculate.

There are 108 houses in 1 town, 362 houses in another town and 269 houses in a third town. Approximately how many houses are there in the three towns together?

There are approximately $100+400+300 \approx 800$ houses in the three towns altogether.
4. Round off to the nearest ten before you calculate the answer in the following.

A farmer has 734 cows. A veld fire breaks out and 568 of the cows are killed.
Approximately how many cows are left?
There are approximately $730-570 \approx 160$ cows left.


To calculate: $68+44=68+2+44-2 \quad$ (add zero pair +2 and -2 )

$$
\begin{aligned}
& =70+42 \\
& =112
\end{aligned}
$$

$\square$
To calculate: $96-41=96+4-41-4 \quad$ (add zero pair +4 and -4 )

$$
\begin{aligned}
& =100-45 \\
& =55
\end{aligned}
$$

5. Round off and compensate to get an accurate answer.
(a) $46+52$
$46+4+52-4=50+48=98$
(b) $76-35$
$76+4-35-4=80+31=41$
(c) $76-34$
$76+4-34-4=80-30=42$
(d) $343+549$
$343-3+549+3=340+552=892$
(e) $886-278$
$886+4-278-4=890-274=608$

### 4.2 Breaking down and building up of numbers

1. Complete the table:

| Number | Add 100 | Add 10 | Add 1 | New number |
| :---: | :---: | :---: | :---: | :---: |
| 79 | 179 | 189 | 190 | 190 |
| 298 | 398 | 408 | 409 | 409 |
| 435 | 535 | 545 | 546 | 546 |

To add numbers, one can break the numbers down into place value parts. You can add the hundreds parts, then the tens parts and lastly the ones parts. Finally, you then build the number up as shown below.

## Examples:

| $143+215$ | - $524+339$ |
| :--- | :--- |
| $=100+200+40+10+3+5$ | $=500+300+20+30+4+9$ |
| $=300+50+8$ |  |
| $=358$ | $=800+50+13$ |
|  | $=800+50+10+3$ |
|  | $=800+60+3$ |
|  | $=863$ |

2. Use the breaking down method to calculate the following.
(a) $134+123$

$$
\begin{aligned}
& =100+30+4+100+20+3 \\
& =100+100+30+20+4+3 \\
& =200+50+7 \\
& =257
\end{aligned}
$$

(b) $128+231$

$$
=100+20+8+200+30+1
$$

$$
\begin{aligned}
& =100+200+20+30+8+1 \\
& =300+50+9 \\
& =359
\end{aligned}
$$

The strategy used above can also be used to do calculations that involve subtraction

## Examples:

| $=973-452$ | • $947-596$ |
| :--- | :--- |
| $=(900-400)+(70-50)+(3-2)$ | $=(900-500)+(40-90)+(7-6)$ |
| $=500+20+1$ | $=400+(40-90)+1$ |
| $=521$ | $=300+(100+40-90)+1$ |
|  | $=300+(100-90+40)+1$ |
|  | $=300+(10+50)+1$ |
|  | $=300+60+1$ |
|  | $=361$ |

3. Use the breaking down method to calculate the following.
(a) 134-123

$$
\begin{aligned}
& =100+30+4-100+20+3 \\
& =100-100+30-20+4-3 \\
& =000+10+1 \\
& =11
\end{aligned}
$$

(b) $231-128$

$$
\begin{aligned}
& =200+30+1-100+20+8 \\
& =200+30^{10}+1-100+20+8 \\
& =200+20+11-100+20+8 \\
& =200-100+20-20+11-8 \\
& =100+00+3 \\
& =103
\end{aligned}
$$

### 4.3 Using a calculator

A calculator can help a user to work quickly and get accurate answers if he or she presses the correct keys. It is very important to know when it is appropriate to use a calculator because some calculations are quicker if they are done mentally rather than using a calculator e.g. $3+6 ; 4 \times 5 ; 100 \div 2 ; 300+500$.

## The calculator Language

The calculator does not think but only does what the user tells it to do. It is then important to learn the calculator language so that you can understand how the calculator works. The calculator language is written as a keystroke sequence using different kinds of key in a calculator. An example of a basic calculator is given.


Let us do simple basic operations on the calculator like this:

| Calculation plan | Calculator keystroke sequence |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $5+4$ | 5 | $+$ | 4 | $=$ |  |
| 5-4 | 5 | - | 4 | = |  |
| $5 \times 4$ | 5 | $\times$ | 4 | = |  |
| $20 \div 4$ | 20 | $\div$ | 4 | $=$ |  |

It is very important to understand that you must always use the " = " key to tell the calculator to now give the answer to what you entered. Note that we are using small numbers here only to explain, and so that we can easily check the calculator mentally. However, we should only use the calculator when doing calculations with large numbers.

1. Estimate the answers and use your calculator to find answers.
(a) $11+21 \quad$ Estimation: $10+20=30 \quad$ Calculation: $11+21=32$
(b) $150+6 \quad$ Estimation:150 $+5=155 \quad$ Calculation: $150+6=156$
(c) 212-103 Estimation:200-100 = 100 Calculation: 212-103 = 109
(d) $136+48$ Estimation:140 $+50=190 \quad$ Calculation: $136+48=184$
(e) $23 \times 52$ Estimation:20 $\times 50=1000$ Calculation: $23 \times 52=1196$
(f) 728-619 Estimation:730-620=110 Calculation: 728-619=109

## UNIT 5

## TIME

### 5.1 Days, weeks, months and years

## Reading calendars and calculating time intervals

There are 365 days in a normal calendar year. There are 12 months in a yearThe months do not all have the same number of days. Eleven of the months have either 30 or 31 days. February, the second month of the year, has 28 days for 3 consecutive years and 29 days for every fourth year. The fourth year where February has 29 days is called a leap year. A period of seven days in a month is called a week, usually taken as starting on Sunday and ending on Saturday. Thus, in a year there are 52 weeks.

We use calendars to measure time in years, months, weeks and days. Years do not all have the same number of days. Three normal calendar years have 365 days each, and then every fourth year, called a leap year has 366 days, since February has 29 days. In the year with 365 days, February has 28 days. 2012 was a leap year, so 2013, 2014 and 2015 were normal years.

1. Draw a line to join the words about time that have the same meaning


We use calendars to measure time in years, months, weeks and days.
2. Study the month of January and complete the table

| JANUARY 2020 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|  |  |  | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 |  |


| Dates | No. of days |
| :--- | :---: |
| $1-15$ January | 15 |
| $7-11$ January | 5 |
| $10-13$ January | 4 |
| $27-30$ January | 4 |
| $20-25$ January | 6 |

3. Study the calendar for 2021. The public holidays are marked in yellow.

Answer the questions that follow:

## 2021

| January |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sun Mon Tue Wed | Thu | Fri | Sat |  |  |  |
|  |  |  |  |  | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 |  |  |  |  |  |  |


| February |  |  |  |  |  |  | March |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|  | 1 | 2 | 3 |  | 5 | 6 |  | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 |  |  |  |  |  |  | 28 | 29 | 30 | 31 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| May |  |  |  |  |  |  | June |  |  |  |  |  |  |
| Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|  |  |  |  |  |  | 1 |  |  | 1 | 2 | 3 | 4 | 5 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 20 | 21 |  | 23 | 24 | 25 | 26 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 | 27 | 28 | 29 | 30 |  |  |  |
| 30 | 31 |  |  |  |  |  |  |  |  |  |  |  |  |
| August |  |  |  |  |  |  | September |  |  |  |  |  |  |
| Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |  |  |  | 1 | 2 | 3 | 4 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 29 | 30 | 31 |  |  |  |  | 26 | 27 | 28 | 29 | 30 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| November |  |  |  |  |  |  | December |  |  |  |  |  |  |
| Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|  | 1 | 2 | 3 | 4 | 5 | 6 |  |  |  | 1 | 2 | 3 | 4 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 28 | 29 | 30 |  |  |  |  | 26 | 27 | 28 | 29 | 30 | 31 |  |

(a) Name the month(s) with 30 days. April; June; September; November
(b) Name the month(s) with more than 30 days.

January; March; May; July; August; October; December
(c) Name the month(s) with fewer than 30 days. February
(d) Is there a pattern that you can use to quickly say how many days there are in any month? Using your knuckles.
(e) Is 2021 a leap year? How do you know that? No. February had 28 days
(f) How many months, weeks and days have passed since the beginning of the year until 15 October 2021? 9 Months; 28 weeks; 198 days
(g) If the date is 15 October 2021, how many years will one still spend at school if one plans to attend school up to Year 4? 3 years
(h) How old are you today in years, months, weeks and days? Answers will vary
4. Study the December month below and answer the questions that follow:

|  | December |  |  |  |  |  |  |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | :---: |
| $\mathbf{S}$ | $\mathbf{M}$ | $\mathbf{T}$ | $\mathbf{W}$ | $\mathbf{T}$ | $\mathbf{F}$ | $\mathbf{S}$ |  |
|  |  |  | 1 | 2 | 3 | 4 |  |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |  |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |  |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |  |
| 26 | 27 | 28 | 29 | 30 | 31 |  |  |

(a) On what day is New Year's Day?

Saturday
(b) What happens in South Africa if a public holiday is on a Sunday? Monday becomes a holiday
(c) How many days is it from Christmas to New Year's Day? 7 days
5. Consider a table of public holidays for 2021.

| January 1 | New Year's Day | Day June 16 | Youth Day |
| :--- | :--- | :--- | :--- |
| March 21 | Human Rights Day | August 9 | Women's Day |
| April 2 | Good Friday | September 24 | Heritage Day |
| April 5 | Family Day | December 16 | Reconciliation Day |
| April 27 | Freedom day | December 25 | 25 Christmas Day |
| May 1 | Worker's day | December 26 | Day of Goodwill |

(a) On what day of the week is Workers' Day in 2021? Saturday
(b) Does September have a public holiday? If so, what is it called and when is it? Yes, Heritage day, 24 September

### 5.2 Decades and centuries

## Decades

A decade is a period of 10 years. Decades may describe any ten-year period, such as those of a person's life, or refer to specific groupings of calendar years.

1. How many years are there in a decade? 10 years
2. Complete the following:
(a) 3 decades $=30$ years
(b) 7 decades $=70$ years
(c) 1 decade $=120$ months
3. Answer the questions based on the table above

| 1990s | 2000s | 2010s | 2020s |
| :--- | :--- | :--- | :--- |
| Nelson | Cell phones | Soccer World | South Africa |
| Mandela | became popular | Cup | was hit by |
| became the |  |  |  |
| president <br> $(1994)$ | and affordable | in South Africa | corona virus |
| $(2010)$ |  |  |  |

(a) How many decades have passed since the cellphones became popular? 2 decades
(b) In which decade were you born? Answers will vary
(c) Count in decades starting from 1980 to 2020.

1980; 1990; 2000; 2010; 2020

## Centuries

A century is a period of 100 years. The word century comes from the Latin word "centum", meaning one hundred.
1800 was the end of the $18^{\text {th }}$ century, 1900 was the end of the $19^{\text {th }}$ century and 2000 was the last year of the $20^{\text {th }}$ century.

1. How many years are there in a century?

100 years
2. How many decades are there in a century?
3. Complete the following:
(a) 4 centuries $=400$ years
(b) 9 centuries $=90$ decades
4. In which century are we now?
5. In which century were you born?
$21^{\text {st }}$ century
$21^{\text {st }}$ century
6. In which century did Nelson Mandela become a president? $20^{\text {th }}$ century
7. In which year will this century end?

2100

### 5.3 Understanding time

There are 24 hours in a day. Time tells us either how much time has passed since midnight or how much time has passed since midday (noon or midnight.


1. In the worksheet provided, draw dotted lines that indicate half of the figure when it is cut vertically

2. Write 12 inside the figure below the bold line where you have drawn dotted lines.

3. From 12, which is regarded as 0 , count the number of the bold calibrated lines and complete the worksheet by writing the numbers inside the clock from 112.

4. How many total counts did you get?

Note: The numbers inside are called hours and are indicated by a short arm in an analogue clock.
5. Count all calibrated markings (clockwise) from 0 which is 12 in this case and write the number of each big count outside the circle.

6. How many total counts did you get? 60

Note: The number of counts in 6 above indicates minutes and are shown by the long arm in the clock.

When the minute arm is at 12 , the time is read as o'clock. When the minute arm moves from 0 to 30 minutes (12-6) we say minute "past the hour". To read time "past" an hour, minutes and hours are read starting from the Right Hand Side, e.g.10:25 is read as 25 minutes past 10.

When the minute arm moves past the 30 minutes (6-12), we say minute "to the hour". When reading or writing time after the minute hand has passed 30 minutes, always subtract the minutes from 60 and add 1 to an hour, e.g. 10:45 is read as 15 minutes to $11\{(60-45=15)$ minutes and $(10+1=11)$ hours $\}$.
7. What fraction of the circle are the following intervals
(a) $0-15$ ?
(b) $0-30$ ?
(c) $30-45$ ?
(d) $0-45$ ?
(e) $45-60$ ?

A quarter
A half
A quarter
Three quarters
A quarter

The interval from 0 to 15 is $\frac{1}{4}$ of an hour i.e. $\frac{1}{4}$ of 60 minutes hence quarter past The interval from 0 to 30 is $\frac{1}{2}$ of an hour i.e. $\frac{1}{2}$ of 60 minutes hence half past The interval from 0 to 45 is $\frac{3}{4}$ of an hour i.e. $\frac{3}{4}$ of 60 minutes hence quarter to One hour is the same length of time as $\mathbf{6 0}$ minutes. Therefore 15 minutes = $\frac{1}{4}$ hour, 30 minutes $=\frac{1}{2}$ hour and 45 minutes $=\frac{3}{4}$ hour, as follows:

8. Complete the following:
(a) 1 hour $=60$ minutes $=3600$ seconds
(b) Half an hour $=30$ minutes $=1800$ seconds
(c) One quarter of an hour $=15$ minutes $=900$ seconds
(d) Three quarters of an hour $=45$ minutes $=2700$ seconds
9. What times do the following clocks show? Write the time in numbers and in words, e.g. 6:15 is quarter past 6.
(a)

(b)



(a) 01:00 One o'clock
(b) 01:15 Quarter past one
(c) 01:30 Half past one
(d) 01:45 Quarter to two
10. Refer to the clocks and your answers in 9 and answer the following questions.
(a) What do you notice about the position of the hour arm and the minute arm in (a)? The hour arm is on 1 and the minute arm is on 12.
(b) What do you notice about the position of the hour arm and the minute arm in (c)? The hour arm is between 1 and 2 and the minute arm is pointing at 6 (half way, away from 0 ).
(c) What do you notice about the position of the hour arm and the minute arm in (b)? The hour arm has moved slightly away from 1 towards 2 and the minute arm is pointing at 3 (a quarter away from 0 ).
(d) What do you notice about the position of the hour arm and the minute arm in (d)? The hour arm has moved closer towards 2 and the minute arm is pointing at 9 (3 quarters away from 0 ).

When the minute arm is at half past, the hour arm should point halfway between the hours. When the minute arm is at o'clock, the hour arm is exactly pointing at the hour. When the minute arm is pointing at any minute past an hour, the hour arm should point shortly after the hour.. When the minute arm is pointing at any minute to an hour, the hour arm should point shortly before the hour
11.What time is indicated in the following clocks?
(a)

(b)

(c)

(a) Five past eight - 08:05
(b) Ten past eight - 08:10
(c) Twenty past eight - 08:20
12. In the worksheet provided, draw the arms of the clock to indicate the following times.

| (a) Quarter past 5 or $5: 15$ | (b) 10 minutes past 10 or $10: 10$ |
| :--- | :--- |
| (c) Quarter to 7 or $6: 45$ | (d) 5 minutes to 11 or $10: 55$ |

### 5.4 Read, tell and write time in 12-hour and 24 -hour formats

## Analogue and digital clocks and watches

In a digital 12 - hour clock, the midday is 12:00 p.m. and after an hour time will be written as 1:00 p.m. whilst in a 24 - hour clock; the midday is 12:00 and after an hour time will be written as 13:00. Midnight will be written at 00:00. NB: 00 on the digital clock indicates the 24th hour/midnight in a 24 -hour clock. In an analogue clock, there is no difference except for stating a.m. or p.m.


12 midnight is 12 a.m.
12 noon (midday) is 12 p.m.

1. Refer to the diagram on 12 -hour and 24 -hour clock above to answer the questions that follow:
(a) Compare and contrast the 12 -hour and 24 -hour format by copying and completing the missing words.
In a 24-hour clock, we count from 0 to 24, whereas in a 12-hour clock we count from 0 to 12, two (2) times.
(b) What symbols do we use to show that the time is read in a 12-hour format? a.m. and p.m.
(c) What do the symbols in (b) above mean? a.m. means morning and p.m. means after noon

## Half past three in the afternoon



A digital clock below is in 24 - hour format. The time is 03:30; this is 3 hours and 30 minutes after midnight or 3:30 a.m. The leading 0 in $03: 30$ in this case indicates that the time was read in the morning.


03:30

## Differences between 12- hour format and 24-hour format

| 12-hour time | 24-hour time |
| :--- | :--- |
| The hour arm goes around the clock <br> twice | The hour arm goes around the clock <br> once |
| After 12 midday we start counting from <br> 1 up to 12 midnight | After 12 midday, we continue counting <br> from 13 up to 24 hrs. which is denoted <br> by 00 |
| The first 9 hours from 12 midnight and <br> 12 midday are indicated by 1 digit | The first 9 hours after midnight have a <br> leading zero to make two digits, e.g. <br> $02 ; 05$ |
| The morning part from midnight is <br> denoted by a.m. and the afternoon <br> part after midday is denoted by p.m. | There is no indication of a.m. and p.m. |

2. Match the 12 -hour clocks with the 24 -hour time. Notice that a.m. or p.m. is written below the 12-hour clocks. Give your answer by writing the letter of the 24 -hour time next to the question number of the 12 -hour clock.

(a) M and N
(b) K and L
3. Complete the following table

| 12-hour time | 24 -hour time | Time in words |
| :--- | :--- | :--- |
| 11:10 a.m. | $11: 10$ | Ten minutes past eleven in the morning |
| 8:50 a.m. | $08: 50$ | Ten minutes to 9 in the morning |
| 4:50 p.m. | $16: 50$ | Ten to five in the afternoon |
| 11:45 p.m. | $23: 45$ | A quarter to midnight |
| 3:00 p.m. | $15: 00$ | Three o'clock in the afternoon |
| 5:32 p.m. | $17: 32$ | Twenty eight minutes to six in the evening |

Analogue and digital clocks also show time in seconds. In a digital clock the seconds will be on the right, the hours will be on the left whilst the minutes will be at the centre, whilst in the analogue clock the thin arm will indicate the seconds: 60 seconds make one minute: $\mathbf{6 0}$ seconds $=\mathbf{1}$ minute

4. Complete the following:
(a) 1 hour $=60$ minutes $=3600$ seconds
(b) Half an hour $=30$ minutes $=1800$ seconds
(c) One quarter of an hour $=15$ minutes $=900$ seconds
(d) Three quarters of an hour $=45$ minutes $=2700$ seconds
5. Write the digital time, in hours, minutes and seconds if the time was read in the morning from the following clocks.

(a) 04:00:40

(b) 00:20:30

(c) $15: 45: 30$
6. Write the following times in both word and digital form (in both 12-hour format and 24 -hr format)

(a) In the morning Quarter to two 01:45

(b) In the afternoon

Twenty five past three
15:25

(c) In the morning

Twenty five past two
02:25
7. Write these 24-hour times in 12-hour notation, in symbols and in words.
(a)


11:59 p.m.
One minute to midnight
(b)


1:50 p.m.
Ten to two in the afternoon

## Stopwatches

We use stopwatches to measure how long an activity takes. There are two types of stopwatches i.e. Analogue and digital. Currently, digital stopwatches are used at most, as they can be available even on cellphones. Stopwatches are normally used to measure the starting time as well as the finishing time i.e. time interval for runners, swimmers, soccer matches, rugby games and debate,
2 TYPES OF STOPWATCHES

1. Estimate the following:
(a) The time it takes a full kettle to boil.

5-10 minutes
(b) The time it takes to walk around the soccer field. 6 minutes (answers will vary)
(c) The maths period in a day.

30 - 60 minutes
2. In 2018, Katleho Mothupi from Free State won the Comrades Marathon (about 90 km ) in 5 hours 20 minutes and 34 seconds (05:20:34). Tumelo Kitie came second in a time of 5 hours 25 minutes and 14 seconds (05:25:14).
The times of the five fastest runners are recorded in the table below.

| Runner | Country | Measured time |  |
| :--- | :--- | :---: | :---: |
| 1. Katleho Mothupi | Free State, SA | $5 h 20 m i n ~ 34 s$ | $05: 20: 34$ |
| 2. Tumelo Kitie | Gauteng, SA | $5 h 25 m i n ~ 14 s$ | $05: 25: 14$ |
| 3. Mandla Mbatha | KZN, SA | $5 h 26 m i n ~ 39 s$ | $05: 26: 39$ |
| 4. Stephen Muzhingi | Zimbabwe | $5 h 27 m i n 18 s$ | $05: 27: 18$ |
| 5. Rufus Photo | Limpopo, SA | $5 h 27 m i n 30 s$ | $05: 27: 30$ |

(a) Mothupi started his race at 6 a.m. At what time did he cross the finishing line? Write the time in 24 -hour notation.
(b) Muzhingi and Photo were very close. How much faster was Muzhingi than

Photo?
(c) How much slower was Mbatha than Kitie?

12 seconds faster
1 minute and 25 seconds

### 5.5 Calculating time intervals

Time interval is the space of time between events or countries.
The longer length of time can be divided into many equal parts i.e. time interval. Like in netball game, there are four quarters played with three intervals, which are separating the quarters.

1. The clocks below show when an activity started and when it ended. Say how long each activity took.

| (a) Starts | Ends | (b) Starts | Starts |
| :--- | :--- | :--- | :--- |
|  |  |  |  |


| Starts | Ends | Interval |
| :--- | :--- | :--- |
| (a) 08:35 | $08: 45$ | 10 minutes |
| (b) $13: 00$ | $13: 45$ |  |

2. Lerato left Johannesburg airport by plane at 08:30 a.m. and arrived in Cape Town airport at 10:40 a.m. How long did the journey take? 2 hours and 10 minutes
3. A soccer practice starts at ten past two in the afternoon and it is one-hour long. What time does the soccer practice end? Ten past three
4. Ngcebo started her homework at quarter to 7 at night and finished it two and half hours later. What time did she finish? 21:15 (quarter past nine in the evening)

## UNIT 1

## WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENG AND PLACE VALUE

### 1.1 Count, represent, order and compare numbers.

1. Complete the pattern
(a) 292; 294; 296; 298 ; 300; 302
(b) 993; 998; $1003 ; 1008 ; 1013 ; 1018$
(c) $2009 ; 2007 ; 2005 ; 2003 ; 2001 ; 1999$
2. Underline odd numbers.

274; 299; 1004; 2 775; 3 779; 4119; 6336; 9333
3. What is the even number that comes before 555 ?
4. Complete the following flow diagram.


### 1.2 Odd and Even numbers

Study the number grid below. Shade the first number, skip one and shade the next. Continue doing that until you have finished shading.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

1. Describe all the numbers that are shaded. These numbers leave a remainder of 1 when divided by 2. [Any suitable answer]
2. What are the shaded numbers called? Odd numbers.
3. Describe all the numbers that are not shaded. These numbers leave a remainder of zero when divided by 2. [Any suitable answer]
4. What are the numbers that are not shaded called? Even numbers

All the shaded numbers end with $1,3,5,7$ or 9 . They cannot be divided into 2 equal groups and are called odd numbers. All the numbers that are not shaded end with 2, 4, 6, 8 and 0 and can be divided into two equal groups and thus called even numbers.

### 1.3 Rounding off

Rounding off numbers is estimation. Estimation is a useful skill that is used in Mathematics when we do calculations. We normally round off number to estimate answers for addition and subtraction. Rounding off means expressing a number as a multiple of $5,10,100$ or 100 making a number simpler but keeping its value close to what it was. Rounding off to the nearest 10.
When rounding off a number to the nearest 10 the ten's value of the number increases to the next upper ten and the unit's digit becomes 0 if the number's unit digit is $5,6,7,8$, 8 or 9 .
When rounding off a number to the nearest 10 the ten's value of the number decreases to the next lower ten if the number's unit digit is $1,2,3$, or 4 .

## Example:

- 373 rounded off to the nearest 10 is 370 , because 373 is closer to 370 than to 380:

- 366 rounded off to the nearest $f 10$ is also 370 because 366 is closer to 370 than to 360.

| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 |
| 36 | 371 |  |  |  |  |  |  |  |  |  |

NB: All the shaded numbers below from 274 to 365 are rounded off to 370 .

## 

These numbers are rounded off to 360 .

1. Round these numbers off to the nearest 10 .
(a) $535 \sim 540$
(b) $1249 \sim 1250$
(c) $5503 \sim 5500$
(d) $3644 \sim 3640$
(e) $2537 \sim 2540$

## Rounding off to the nearest 100.

When rounding off a number to the nearest 100 the hundred's value of the number increases to the next upper hundred and both the tens and the unit's digits become 0 if the number's ten's digit is $5,6,7,8$, or 9 .

When rounding off a number to the nearest 100 the hundred's value of the number decreases to the next lower hundred and both the ten's and the unit's digits become
0 if the number's ten's digit is $0,1,2,3$, or 4 .

## Examples:

- 1353 rounded off to the nearest 100 is 1400 , because 1353 is closer to 1 400 than to 1300.
- 1449 rounded off to the nearest 100 is 1400 , because 1449 is closer to 1 400 than to 1300.


If the digit in the tens place is $0,1,2,3$, or 4 , to round off to the nearest multiple of 100, replace the ones digit and the tens digit by 00, then keep the hundreds digit the same. i.e. $1353 \sim 1400$

If the digit in the tens place is $5,6,7,8$ or 9 , to round off to the nearest multiple of 100 , replace the ones digit and the tens digit by 00 , then add 1 hundred (100) to the hundreds digit. i.e. $1353 \sim 1400$
2. Round these numbers off to the nearest 100.
(a) $369 \sim 400$
(b) $1850 \sim 1900$
(c) $1845 \sim 1800$
(d) 2 232~2 200
(e) $8947 \sim 8900$

## Rounding off to the nearest 1000.

When rounding off a number to the nearest 1000 the thousand's value of the number increases to the next upper thousand and the hundreds, tens and the unit's digits become 0 if the number's hundred's digit is $5,6,7$, 8 , or 9 .

When rounding off a number to the nearest 1000 the thousand's value of the number decreases to the next lower thousand and the hundreds, tens and the unit's digits become 0 if the number's hundred's digit is $0,1,2,3$, or 4 .

## Examples:

- 2374 rounded off to the nearest thousand is 2000 because 2374 is closer to 2000 than to 3000 as shown in the number line.

- 2674 rounded to the nearest thousand is 3000 because it is closer to 3000 than 2000.


If the digit in the hundreds place is $0,1,2,3$, or 4 , to round off to the nearest multiple of 1000, replace the ones digit, tens digit and hundreds digit each by 0 , then keep the thousands digit the same. i.e. $2 \mathbf{3 7 4}$ ~ 2000
If the digit in the hundreds place is $5,6,7,8$ or 9 , to round off to the nearest multiple of 1000, replace the ones digit tens digit and hundreds digit each by 0 , then add 1 thousand (1000) to the thousands digit. i.e. 2674 ~ 3000
3. Round these numbers off to the nearest 1000.
(a) $1500 \sim 2000$
(b) $7499 \sim 7000$
(c) $8799 \sim 9000$
(d) $2800 \sim 3000$
4. Complete the table to show how the numbers on the left column should be rounded off to the nearest 10, 100 and 1000.

| Number | ten <br> $(\mathbf{1 0 )}$ | Hundred <br> $(\mathbf{1 0 0})$ | Thousand <br> $(\mathbf{1 0 0 0})$ |
| :---: | :---: | :---: | :---: |
| 763 | 760 | 800 | 1000 |
| 282 | 280 | 300 | 0 |
| 4999 | 5000 | 5000 | 5000 |
| 5455 | 5460 | 5500 | 5000 |

## UNIT 2

## NUMBER SENTENCES

### 2.1 Open and Closed number sentence

A number sentence is a mathematical sentence written in numbers and mathematical symbols. The term number sentence may be used in the place of the word equation.

A closed number sentence is when all the terms of the sentence are known
Example: $6+7=13$
An open number sentence is when one of the terms of the sentence is unknown
Example: $56-19=\Delta$

1. Complete the following number sentence
(a) $6 \times 7=42$
(b) $56-19=37$
(c) $99 \div 11=9$
(d) $120+30=150$
2. State whether the following number sentences are true or false. If false, correct it.
(a) $4 \times 7=23$. False: $4 \times 7=28$
(b) $32-0=0$. False: $32-0=32$
(c) $58 \div 11=5$. False: $55 \div 11=5$
(d) $100+10=150$. False: $100+50=150$

### 2.2 Properties of whole numbers

## Identity element of 1

Any number multiplied by 1 results in a number itself as a product.
1 is called an identity element for multiplication.
NB: $25 \times 1=1 \times 25=25$

1. Complete the following:
(a) $250 \times 1=250$
(b) $139=1 \times 139$
(c) $1 \times 3135=3135$
(d) $250 \div 250=1$
(e) $250 \div 1=250$
(f) $1139 \div 1139=1$
(g) $1139 \div 1=1139$
(h) Any number multiplied or divided by 1 is equal to the number itself.

Multiplication and division are closely related.t Multiplication is an inverse of division. If you take any number $\boldsymbol{a}$, multiply it by another number $\boldsymbol{b}$ and then divide by the same number $\boldsymbol{b}$, or the other way around, the number you started with $\boldsymbol{a}$ remains the same.

## Example:

$$
\begin{aligned}
& 5000 \times 5 \div 5 \\
& =(5000 \times 5) \\
& =5000 \times(5 \\
& =5000 \times 1
\end{aligned}
$$

$$
=(5000 \times 5) \div 5 \quad \text { (one way of grouping) }
$$

$$
=5000 \times(5 \div 5) \quad \text { (an equivalent grouping) }
$$

$$
=5000 \quad \text { (multiplicative property of 1) }
$$

1. Complete the following number sentences.
(a) $67 \times 9 \div 9=67$
(b) $100 \times 100 \div 100=100$
(c) $4778 \div 4 \times 4=4778$
(d) $125 \div 25 \times 25=125$
2. Complete the following table. You may use a calculator.

| Number | Multiply by | Divide by | Answer |
| :--- | :--- | :--- | :--- |
| 150 | 20 | 20 | 150 |
| 5430 | 39 | 39 | 5430 |
| 1499 | 50 | 50 | 1499 |

3. A number is hidden behind the $\square$ stickers. It is the same number behind each of the $■$ stickers. Say whether each number sentence is true or false.
(a) $\square \times 1=\square$-----Any number
(b) $■ \times 30 \div 30=1$----Any number
(c) $(\square+\square) \times 1=\square 0$
(d) $■ \div \square=1$----Any number except zero

## UNIT 3

## WHOLE NUMBERS: ADDITION AND SUBTRACTION

### 3.1 Rounding off to estimate answers

When estimating answers first round off the numbers and add or subtract the rounded numbers.

## Examples

| $3437+6798$ | $\approx 3000+7000$ |
| ---: | ---: |
|  | $\approx 10000$ | | $8639-5343$ | $\approx 9000-5000$ |
| ---: | :--- |
|  | $\approx 4000$ |

1. Estimate the answers to the following:
(a) $8524+1499 \approx 10000$
(b) $2336+3247 \approx 5000$
(c) $5475-2369 \approx 3000$
(d) $7846-3500 \approx 4000$
(e) $8464-2352+3778 \approx 10000$

### 3.2 Expanded column method

To add or subtract numbers, first write that in expanded form

## Example:

| $1562+3415=$ | $4977-3415=$ | $8888-7359=$ |
| :---: | :---: | :---: |
| $1000+500+60+2$ | $4000+900+70+7$ | $8000+800+70+18$ |
| $+\underline{3000+400+10+5}$ | $-\frac{3000-400-10-5}{4000+900+70+7}$ | $-\frac{7000-300-50-9}{1000+500+60+2}$ |
| $\frac{15000+500+20+9}{156+3415=4977}$ | $\therefore 4977-3415=\mathbf{1 5 6 2}$ | $\therefore 8888-7359=\mathbf{1 5 2 9}$ |

Check solution by subtraction or using a calculator

1. Calculate the following and check the answers by addition or substitution.
(a) $6425+2374=6000+400+20+5$

$$
\begin{aligned}
& \underline{2000+300+70+4} \\
& 8000+700+90+9 \\
&= \underline{8799}
\end{aligned}
$$

(b) $7542-3440=7000+400+130+12$

$$
\begin{aligned}
& -(3000+300+70+4) \\
& 4000+100+60+8 \\
& =\underline{4168}
\end{aligned}
$$

(c) $5793+3324=5000+700+90+3$

$$
\begin{aligned}
& \underline{3000+300+20+4} \\
& 9000+100+10+7 \\
&= \underline{9117}
\end{aligned}
$$

(d) $8651-5692=7000+1500+140+11$

$$
\begin{aligned}
& (5000+600+90+2) \\
& 2000+900+50+9 \\
= & \underline{2959}
\end{aligned}
$$

## UNIT 4

## WHOLE NUMBERS: MULTIPLICATION AND DIVISION

### 4.1 Multiples, Factors and Products

## Multiples, factors and products

The number 40 can be obtained by calculating $5 \times 8$. We can say 40 is the product of 5 and 8 . We can also say 40 is a multiple of 5 or 40 is also a multiple of 8 . Therefore 8 is a factor of 40 and 5 is also a factor of 40 .
We can also express (write) 40 as the product of two whole numbers in other ways:

$$
2 \times 20=40 \text { and } 4 \times 10=40
$$

We can also express 40 as the product of 1 and 40 because $1 \times 40=40$.

## Products and factors

24 squares can be presented in different ways as shown below


Thus, 24 can be expressed as a product of 6 and 4 or 8 and 3 or 12 and 2 or 24 and 1. These pairs are called factor pairs. They are all factors of 24 which means that if you multiply each pair it gives you 24 as a product, e.g. $1 \times 24=$ $24 ; 2 \times 12=24 ; 3 \times 8=24$ and $4 \times 6=24$.

A factor is a number that divides another completely without leaving a remainder.

| Numbers | Division | Factor pair |
| :---: | :---: | :---: |
| 1 | $18 \div 1=18$ | $1 \times 18$ |
| 2 | $18 \div 2=9$ | $2 \times 9$ |
| 3 | $18 \div 3=6$ | $3 \times 6$ |

The factors of 18 are $1 ; 2 ; 3 ; 6$ and 18.

1. Write down all the factors of
(a) Factors of $25=\{1 ; 5 ; 25\}$
(b) Factors of $36=\{1 ; 2 ; 3 ; 4 ; 6 ; 9 ; 12 ; 18 ; 36\}$
(c) Factors of $42=\{1 ; 2 ; 3 ; 6 ; 7 ; 21 ; 42\}$
(d) Factors of $100=\{1 ; 2 ; 4 ; 5 ; 10 ; 20 ; 25 ; 50 ; 100\}$
2. A number can be expressed (written) as a product of two equal factors, e.g. 36 is a product of $6 \times 6$. List all the different ways in which each of the following numbers can be expressed as a product of two numbers (factors).

| $\text { (a) } \quad \begin{aligned} 28 & =1 \times 28 \\ 28 & =2 \times 14 \\ 28 & =4 \times 7 \end{aligned}$ | (b) $23=1 \times 23$ | $\text { (c) } \quad \begin{aligned} 60 & =1 \times 60 \\ 60 & =2 \times 30 \\ 60 & =3 \times 20 \\ 60 & =4 \times 15 \\ 60 & =6 \times 10 \end{aligned}$ |
| :---: | :---: | :---: |
| (d) $17=1 \times 17$ | (e) $\begin{aligned} & 120=1 \times 120 \\ & 120=2 \times 60 \\ & 120=3 \times 40 \\ & 120=4 \times 30 \\ & 120=5 \times 24 \\ & 120=6 \times 20 \\ & 120=8 \times 15 \\ & 120=10 \times 12 \end{aligned}$ | $\text { (f) } \begin{aligned} 160 & =1 \times 160 \\ 160 & =2 \times 80 \\ 160 & =4 \times 40 \\ 160 & =5 \times 32 \\ 160 & =8 \times 20 \\ 160 & =10 \times 16 \\ 160 & =10 \times 80 \end{aligned}$ |

3. By what number do you have to multiply 40 to get
(a) 240 ? 60
(b) 480 ?
4. Express each of the following numbers as factors such that one factor is 40 .

| (a) $280=7 \times 40$ | (b) $320=8 \times 40$ | (c) $400=10 \times 40$ |
| :--- | :--- | :--- |
| (d) $440=11 \times 40$ | (e) $480=12 \times 40$ | (f) $1280=32 \times 40$ |

## Multiples

A multiple is obtained when two numbers are multiplied.
A product is obtained when two or more numbers are multiplied.
A number that divides another number without leaving a remainder is a factor of that number.

Example: Write all the first ten multiples of 8 .

| Factors | $1 \times 8$ | $2 \times 8$ | $3 \times 8$ | $4 \times 8$ | $5 \times 8$ | $6 \times 8$ | $7 \times 8$ | $8 \times 8$ | $9 \times 8$ | $10 \times 8$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Multiples | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |

Multiples of 8 are $8 ; 16 ; 24 ; 32 ; 40 ; 48 ; 56 ; 64 ; 72 ; 80$

All these are multiples of 8 , e.g. 48 is a multiple of 8 , because $8 \times 6=48$.
72 is also a multiple of 8 , because $8 \times 9=72$, etc.
NB: Multiples are products but you cannot say that products are multiples.

1. Complete the following table.

## Write the multiples of 3 .

| Multiplication (Multiply 3 by <br> counting numbers from 0 to 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Multiples | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 |
| Multiples of 3 are_3_; 6__;_9__; 12__;... |  |  |  |  |  |  |  |  |

2. Write the first five multiples of the following numbers:
(a) Multiples of $6=\{6 ; 12 ; 18 ; 24 ; 30\}$
(b) Multiples of $50=\{50 ; 100 ; 150 ; 200 ; 250\}$
(c) Multiples of $150=\{150 ; 300 ; 350 ; 400 ; 450\}$
(d) Multiples of $1200=\{1200 ; 2400 ; 3600 ; 4000 ; 4800\}$

### 4.2 Multiplication

## Multiplying by multiples of 10 and 100

Some calculations can be done mentally, e.g. $30 \times 8=3 \times 10 \times 8=240$

1. Work out the following:

| (a) $3 \times 8=24$ | (b) $30 \times 8=240$ | (c) $30 \times 80=2400$ | (d) $3 \times 800=2400$ |
| :--- | :--- | :--- | :--- |
| (e) $4 \times 8=32$ | (f) $40 \times 8=320$ | (g) $40 \times 80=3200$ | (h) $4 \times 800=3200$ |
| (i) $5 \times 6=30$ | (j) $5 \times 60=300$ | (k) $50 \times 60=3000$ | (l) $5 \times 600=3000$ |

One can also work out calculations quickly by recognizing whether a number is doubled or not.

## Example.

$3 \times 8=24$, therefore $6 \times 8=48.6$ is double 3 , the multiplier 8 is the same, therefore double 24 is 48 .
$20 \times 8=160$, therefore $40 \times 8=320$, because 40 is double 20, therefore doubling 160 we get 320 .
2. Copy the table below, and fill in the answers that you did not know when you did question 1.

| $\times$ | 2 | 4 | 8 | 3 | 6 | 5 | 10 | 9 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10 | 20 | 40 | 80 | 30 | 60 | 50 | 100 | 90 |
| 20 | 40 | 80 | 160 | 60 | 120 | 100 | 200 | 180 |
| 40 | 80 | 160 | 320 | 120 | 240 | 200 | 400 | 720 |
| 80 | 160 | 320 | 640 | 240 | 480 | 400 | 800 | 720 |
| 30 | 60 | 120 | 240 | 90 | 180 | 150 | 300 | 270 |
| 60 | 120 | 240 | 480 | 180 | 360 | 300 | 600 | 540 |
| 70 | 140 | 280 | 560 | 210 | 420 | 350 | 700 | 630 |

Now look at this: $\quad 457=400+50+7$

$$
\begin{aligned}
10 \times 457 & =10 \times 400+10 \times 50+10 \times 7 \\
& =4000+500+70
\end{aligned}
$$

When 457 is multiplied by 10 the 400 becomes 4 000 , the 50 becomes 500 and the 7 becomes 70
3. Use the method above to show what will 583 be if 100 multiply it.

Write 583 as is and put two zeros after the last digit.
4. How much is each of the following?
(a) $128 \times 10=1280$
(b) $128 \times 100=12800$
(c) $263 \times 10=2630$
(d) $263 \times 100=26300$
(e) $345 \times 10=3450$
(f) $345 \times 100=34500$

## Multiplication of 1-digit by 1-digit whole number

Multiplication is when you add a number to itself a number of times as indicated by the multiplier. e.g. $9 \times 3=9+9+9=27$. It can be done in different ways, for example by breaking down numbers, column method and using a calculator.

## Example 1

Write down the answers as quickly as you can.

$$
\begin{aligned}
& 9 \times 1=9 \\
& 9 \times 2=18 \\
& 9 \times 3=27 \\
& 9 \times 4=36 \\
& 9 \times 5=45 \\
& 9 \times 6=54
\end{aligned}
$$

Having the information above, you can be able to find any multiple of 9 .

$$
\begin{aligned}
9 \times 6 & =(9 \times 5)+(9 \times 1)=54 \\
& =(9 \times 4)+(9 \times 2)=54 \\
& =(9 \times 3)+(9 \times 3)=54
\end{aligned}
$$

When using this strategy make sure that the multipliers add up to the original multiplier (in this case 6 is our original multiplier).

## Example 2

$$
\begin{aligned}
7 \times 8 & =(7 \times 3)+(7 \times 5)=56 \\
& =(7 \times 2)+(7 \times 6)=56 \\
& =(7 \times 1)+(7 \times 7)=56
\end{aligned}
$$

1. Write down the answers.
(a) $6 \times 8=48$
(b) $4 \times 7=28$
(c) $7 \times 9=63$

Counting takes a lot of time, especially when there are many objects to be counted. For instance, it may take a lot of time to count all the squares shown below.


- There are sixteen columns of squares and nine rows of squares.
- A quicker way is to add 16 repeatedly: $16+16+16+\ldots$
- However, if you can calculate $16 \times 9$, it is even quicker!

To be able to calculate something like $16 \times 9$, you need to know some multiplication facts, such as $10 \times 9=90$ and $6 \times 9=54$. In this unit, you will learn many facts like these. Multiplication is when you take a number and add it to itself a number of times. It can be done in different ways, for example by repeated addition and breaking down numbers into parts that are easy to multiply. Multiplication can also be done by lattice method (Napier's rods).

Example 3: Multiplication by repeated addition

$$
\begin{aligned}
16 \times 9 & =16+16+16+16+16+16+16+16+16 \\
& =144
\end{aligned}
$$

You will learn to multiply with bigger numbers, e.g. how to calculate $6 \times 54$ or $73 \times 5$.

If you can do such calculations, you can easily and quickly find out how many rings are there in the diagram below, without counting all the rings.


Bonga knows that $7 \times 40=280$. He also knows that $7 \times 6=42$.
Bonga thinks he can use this knowledge to quickly find out how many rings there are in the above diagram.

1. Do you think the diagram below has the same number of rings as the diagram above?

| ○ ○ ○ ○ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| - ○○○ | $\bigcirc$ - © © | - ○○○ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| - ○○○ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| - ○ ○ ○ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ |
| ○ ○ ○ ○ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc \bigcirc$ | $\bigcirc \bigcirc$ |


| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | - | - | $\bigcirc$ | - |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | - | - | - |
| $\bigcirc$ | - | - | - | - | - | - |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | - | - | $\bigcirc$ | $\bigcirc$ |
| $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | $\bigcirc$ | - | $\bigcirc$ | $\bigcirc$ |

2. Do you agree that in the diagram in question 1 , there are $7 \times 40$ rings and another $7 \times 6$ rings?
```
Yes
```

3. If $7 \times 40=280$ and $7 \times 6=42$, how many rings are there altogether? 332 rings
4. Work out how many rings there are in this diagram.

5. Calculate the number of rings in the diagram. $(30+6) \times 6=216$


## Multiplication strategies

## Breaking down and building up

This multiplication method breaks down the number into its place value parts and multiply each part by the multiplier. The products of place value parts and the multiplier are then added together. The sum is presented as a number symbol.

## Column Method

In this method, the number parts are multiplied with each product written underneath each other in column and the products are added.

## Napier's rods or Lattice and column methods

This multiplication method uses a grid with a size depending on the number of digits of the multiplicand and multiplier. Inside the grid, each square or rectangle is divided with a diagonal line from the top right corner to left bottom corner. The multiplicand is written on the top of the grid with each digit aligned to a column. The multiplier written on the right side of the grid with each digit aligned to the row. In each column, the tens digit is always written above the diagonal and the ones digit is written below. Numbers are then added diagonally to get the sum.
N.B. Each number is regarded as a single digit. This short cut can be used when one has grasped the number sense fully

| Breaking down and building up | Column | Lattice |
| :---: | :---: | :---: |
| $223 \times 8$ can be calculated as follows: $\begin{aligned} & \quad 223=200+20+3 \\ & \text { So, } 223 \times 8=(200 \times 8)+ \\ & (20 \times 8)+(3 \times 8) \\ & =1600+160+24 \\ & =1000+600+100+60+20+4 \\ & =1784 \end{aligned}$ | $\begin{aligned} \hline 341 \times 7= & \\ 341 & \\ \times \quad 7 & (7 \times 1) \\ 280 & (7 \times 40) \\ +\frac{2100}{2387} & (7 \times 300) \\ \underline{2387} & \end{aligned}$ | $486 \times 9=$ $\qquad$ |
| $\therefore 223 \times 8=1784$ | $\therefore 341 \times 7=2387$ | $\therefore 486 \times 9=4374$ |

1. Calculate each of the following.

| $28 \times 6=168$ | $4 \times 78=312$ | $62 \times 9=558$ | $8 \times 53=424$ |
| :--- | :--- | :--- | :--- |
| $7 \times 47=329$ | $75 \times 5=375$ | $7 \times 84=588$ | $9 \times 93=837$ |
| $528 \times 6=3168$ | $4 \times 378=1512$ | $362 \times 9=3258$ | $8 \times 523=4184$ |
| $7 \times 407=2849$ | $785 \times 5=3925$ | $7 \times 284=1988$ | $9 \times 493=18353$ |

2. Mrs Jacobs is baking cookies. She places 6 rows of cookies on a baking tray. There are four cookies in one row. If she fills five baking trays, how many cookies is she baking? $5 \times 6 \times 4=120$ cookies
3. At a bakery, 263 loaves of brown bread are baked a day. How many such loaves are baked in 3 days? $263 \times 3=789$ loaves are baked in 3 days
4. A bag of onions has a mass of 875 g . Calculate the total mass of eight bags of onions of the same kind. Give your answer in grams.
$875 \times 8=7000$ onions

### 4.3 Division

## Division of 1-digit-by-1-digit whole numbers

## Example

Division is the same as repeated subtraction
$8 \div 2=4$ this means you can subtract 2 four times from 8 .
$8-2-2-2-2=0$

1. Divide the following
(a) $6 \div 2=3$
$6-2-2-2=0$
(b) $8 \div 4=2$
$8-4-4=0$
(c) $9 \div 3=3$
$9-3-3-3=0$

Division of 2-digit by 1-digit whole numbers

| Example 1 | Example 2 |
| :--- | :--- |
| Breaking down the one-digit number <br> into its factors | You can also break down the two-digit <br> whole number into multiples of the one-digit <br> $56 \div 4=56 \div 2 \div 2$ <br> number |
| $=(56 \div 2) \div 2$ | $56 \div 4$ $=(28+28) \div 4$ <br> $=14$ $=(28 \div 4)+(28 \div 4)$ <br>  $=7$ <br>  $=14$ |

2. Divide the following numbers
(a) $88 \div 4=88 \div 2 \div 2$

$$
\begin{aligned}
& =(88 \div 2) \div 2 \\
& =44 \div 2 \\
& =22
\end{aligned}
$$

(b) $54 \div 9$

$$
\begin{aligned}
& =(54 \div 3) \div 3 \\
& =(54 \div 3) \div 3 \\
& =18 \div 3 \\
& =6
\end{aligned}
$$

(c) $42 \div 7$

$$
\begin{aligned}
& =6 \times(7 \div 7) \\
& =6 \times 1 \\
& =6
\end{aligned}
$$

$$
\begin{aligned}
88 \div 4 & =(44+44) \div 4 \\
& =(44 \div 4)+(44 \div 4) \\
& =11+11 \\
& =22
\end{aligned}
$$

$$
\begin{aligned}
54 \div 9 & =(27+27) \div 9 \\
& =(27 \div 9)+(27 \div 9) \\
& =3+3 \\
& =6
\end{aligned}
$$

$$
\begin{aligned}
42 \div 7 & =(21+21) \div 7 \\
& =(21 \div 7)+(21 \div 7) \\
& =3+3 \\
& =6
\end{aligned}
$$

$$
\text { (d) } 65 \div 5 \text { } \begin{aligned}
& 13 \times(5 \div 5) \\
= & 13 \times(1) \\
= & 13
\end{aligned}
$$

$$
\begin{aligned}
65 & \div 5 \\
& (40+25) \div 5 \\
= & (40 \div 5)+(25 \div 5) \\
= & 8+5 \\
= & 13
\end{aligned}
$$

Division of a 3-digit by 1-digit whole numbers

| Example 1 | Example 2 |
| :--- | :--- |
| Calculate by breaking down the three- | Calculate by dividing the one-digit |
| digit number into multiples of the one- |  |
| digit number |  |
| $426 \div 6$ $=(420+6) \div 6$ <br>  $=(420 \div 6)+(6 \div 6)$ <br>  $=70+1$ <br>  $=71$ | $426 \div 6$ $=426 \div 2 \div 3$ <br>  $=(426 \div 2) \div 3$ <br>  $=213 \div 3$ |
|  |  |

3. Calculate the following:
(a) $399 \div 3$

$$
\begin{aligned}
& (300+99) \div 3 \\
& (300 \div 3)+(99 \div 3) \\
& (100)+(33) \\
& 133
\end{aligned}
$$

$$
399 \div 3=133
$$

(b) $525 \div 5$
$(500+25) \div 5$
(c) $525 \div 5=105$
$(500 \div 5)+(25 \div 5)$
$100+5$
105
(d) $896 \div 8$
$(800+96) \div 8$
$896 \div 4 \div 2$
$(800 \div 8)+(96 \div 8)$
$(896 \div 4) \div 2$
$(100)+(12)$
$=224 \div 2$
112
$=112$

## UNIT 5

## COMMON FRACTIONS

### 5.1 Describing fractions

Fraction can be done practically by paper folding for better understanding. The fraction is a part of a whole. If a whole is cut or divided into equal pieces, each piece of that whole is a fraction.

| $\frac{\mathbf{1}}{\mathbf{3}}$ | $\frac{1}{3}$ | $\frac{1}{3}$ |
| :---: | :---: | :---: |

The strip above is divided into 3 parts. Each part indicated by the different colours is a third. It has two parts, a numerator and a denominator. Thus, a fraction is named according to the fraction part (numerator) and the total number of parts that a whole is divided into (denominator) e.g.


1. Name the fractions that are shaded in the strips

| (a) |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| (b) | One whole |  |  |  |  |  |
| One half |  |  |  |  |  |  |
| (c) | One quarter |  |  |  |  |  |
| (d) | One fifth |  |  |  |  |  |

2. Identify which fractions are shaded in the circles

|  | (c) 1 quarter | (d) 1 fifth |
| :--- | :--- | :--- | :--- |
| (a) 1 whole 1 half | (b) |  |

Five children share a loaf of bread equally. "Equally" means that every child gets the same. What fraction of bread does each child get?


The bread is divided into five equal parts. Each of these parts is called one fifth of the loaf. If a loaf of bread or a group of objects is divided into seven equal parts, each part is called one seventh of the whole.
3. Make rough sketches to show how each of the following can be shared equally between six children: (answer showing understanding)
(a) one slice of bread
(b) one loaf of bread
(c) 24 peanuts


### 5.2 Comparing and ordering fractions with different denominators

Fractions can be compared or ordered by arranging them from smallest to biggest or vice versa. When the fractions are compared, some notations or signs are used i.e. $<,>$ and $=$.

1. Use <; > or = to complete the following:
(a) $\frac{1}{1}>\frac{1}{4}$
(b) $\frac{1}{4}<\frac{1}{2}$
(c) $\frac{3}{4}>\frac{2}{5}$
(d) $\frac{3}{4}<\frac{4}{5}$
(e) $\frac{1}{2}=\frac{2}{4}$
(f) $\frac{4}{4}=\frac{5}{5}$

### 5.3 Adding and subtracting fractions with the same denominator

## Adding common fractions

Fractions can be added or subtracted. We only subtract a smaller fraction from a bigger fraction, thus decreasing the quantity. Sometimes, the sum of fractions can lead to a whole e.g. $\frac{3}{5}+\frac{2}{5}=\frac{5}{5}=1$

1. In the figure below shade $\frac{1}{5}$ and shade another $\frac{2}{5}$ in different colours.

Complete the table by shading the indicated fractions differently and indicate the total number of shaded parts

|  | Fractions |  | Fraction of shaded parts |  |
| :--- | :--- | :--- | :--- | :--- |
| (a) |  |  | $\frac{1}{2}+\frac{1}{2}=$ |  |
| (b) |  |  |  |  |

2. Without shading the fractions, add the following fractions
(a) $\frac{3}{4}+\frac{1}{4}=\frac{4}{4}$
(b) $\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$
(c) Two fifths + three fifths $=$ five fifths
(d) Two quarters + one quarter = three quarters
3. Complete:
(a) $\frac{2}{4}+\frac{1}{4}=\frac{3}{4}$
(b) $\frac{2}{5}+\frac{3}{5}=\frac{5}{5}$
(c) $\frac{1}{2}+\frac{1}{2}=\frac{2}{2}$

## Subtracting common fractions

Fractions can be subtracted by carrying out the following steps:
Step 1: First shade the bigger fraction
Step 2: Subtract the smaller fraction by shading on top of the shaded part using different shading.
Step 3: Write the fraction that is shaded once.
N.B the fraction that is shaded once is the difference between the two fractions. e.g. $\frac{3}{5}$ and $\frac{1}{5}$; thus $\frac{3}{5}-\frac{1}{5}=\frac{2}{5}$

4. Complete the table by shading the indicated fractions below:

|  | Fractions | Fraction shaded |
| :---: | :---: | :---: |
| (a) |  | $\frac{2}{2}-\frac{1}{2}=\frac{1}{2}$ |
| (b) |  | $\frac{4}{5}-\frac{3}{5}=\frac{1}{5}$ |
| (c) |  | $\frac{3}{4}-\frac{1}{4}=\frac{2}{4}$ |
| (d) | $7$ | $\frac{5}{5}-\frac{3}{5}=\frac{2}{5}$ |

5. Without drawing diagrams, work out the following:
(a) $\frac{2}{2}-\frac{1}{2}=\frac{1}{2}$
(b) $\frac{4}{5}-\frac{2}{5}=\frac{2}{5}$
(c) Two quarters - one quarter $=$ one quarter
6. Complete:
(a) $\frac{3}{4}-\frac{2}{4}=\frac{1}{4}$
(b) $\frac{5}{5}-\frac{4}{5}=\frac{1}{5}$
(c) $\frac{1}{2}-\frac{1}{2}=0$

### 5.4 Equivalent fractions

When two or more fractions yield to the same result when simplified, they are said to be equivalent. Thus, any fraction can be represented in different ways but conserve the same value after simplification. e.g., $\frac{2}{4}$ and $\frac{1}{2}$ are equivalent fractions.


1. Given the fraction wall, write the fraction on each part.

| 1 whole |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\frac{1}{2}$ |  |  | $\frac{1}{2}$ |  |
| $\frac{1}{4}$ |  |  |  | $\frac{1}{4}$ |
| $\frac{1}{5}$ | 5 | $\frac{1}{5}$ | $\frac{1}{5}$ | $\frac{1}{5}$ |

2. What fractions are equal to: [Any suitable answer]
(a) $\frac{1}{2}=\frac{1}{4}+\frac{1}{4}$
(b) $\frac{5}{5}=\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$
(c) $\frac{2}{4}=\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$

### 5.5 Solving problems

## Grouping and equal sharing

1. R50 is divided equally between a number of people. Each person gets R10.

(a) How many people shared the money?
(b) What fraction of the money did each person get?


5 people
$\frac{1}{5}$ or 1 fifth
2. A teacher shares pens that he bought equally among his four classes. What fraction of all the pens does each of the classes get? $\quad \frac{1}{4}$ or 1 quarter
3. During the rugby trials, 72 players are divided equally into three groups. Each group has its own field. What fraction of all the players are in each
field?

$$
\frac{3}{72}=\frac{1}{24}
$$

## UNIT 6

## LENGTH

When we measure the length of objects or spaces, we are allocating a number value to how long or wide the object or space is. This allows us to compare and order objects in terms of their length. Today, in many parts of the world, we use the same system of unit to measure length. The standard unit for length is a metre $(m)$. This makes it possible for us to tell other people how long an object is. The other units of length such as millimetres (mm), centimetres (cm), and kilometres (km) are derived from a metre.

### 6.1 Compare and estimate lengths of objects

1. Which of the following pairs of objects is longer?
(a) The height of a classroom door or the length of a desk.
(b) The width of a classroom door or the width of a chalkboard.
(c) The length of your hand or the length of your foot.
2. Follow the instructions to answer the questions below: Accept any reasonable response.
(a) Use the palm of your hand to measure the length of the text book.
(b) Use your feet to measure the length of the wall of their classroom.
(c) Are your answers to the above the same as of other learners? Why?

### 6.2 Practical measuring objects using measuring instruments

One metre is the standard unit and the other units are named for how they relate to the metre. A centimetre (cm) is one of the parts if 1 m is divided into 100 equal parts. There are 100 cm in 1 m . Centi- in centimetre means hundredth. A millimetre ( mm ) is one of the parts that is formed when 1 m is divided into 1000 equal parts. There are 1000 mm in 1 m . Milli- in millimetre means thousandth. There are 10 mm in 1 cm . A kilometre ( $\mathbf{k m}$ ) is 1000 times as long as 1 m . Kiloin kilometre means thousand. On measuring tapes, you will see millimetres, centimetres and metres ( m ). We use measuring tapes to measure longer lengths, such as the height of a person or the length of a skirt. For even longer distances,
such as the length of a wall in a building, there are builder's tape measures and surveyor's tape measures. For long distances, we use trundle wheel.


Most rulers have centimetres (cm) and millimetres (mm) as their units. We use rulers to measure shorter lengths such as the length of a book or the length in a geometric figure. Now look at the ruler below. There are 1 cm spaces on the ruler.


Each centimetre space is divided into 10 equal smaller spaces called millimetres. So every centimetre is divided into tenths of a centimetre. This means that the space of 1 cm is the same length as the space that is 10 mm long.

1. Which of the units will you use if you have to measure the length of each of these objects?
(a) the length of your textbook -
(b) the length of the classroom -
(c) the length of your pencil -
(d) the thickness of your pencil -
(e) the distance between two towns -
(f) the distance around your school yard -
(g) the distance around a soccer field -
(h) the height of the window in your classroom -
centimetres
metres
centimetres
millimetres
kilometres
metres
metres
centimetres
2. Name three objects that are about the length of a centimetre.
(Hint: look at your hands or look around in the classroom.)
Any reasonable response.
3. Name three objects that are about 10 cm long or wide.

Accept any reasonable response.
4. Name three objects that are about 30 cm long or wide.

Accept any reasonable response.
5. Now use some of the objects that you named in questions 2 to 4 to help you estimate the following:

Accept any reasonable response.
6. Estimate how long your thumb is. Accept any reasonable response.
7. Estimate how long your desk is. Accept any reasonable response.
8. Estimate how wide the distance is between two desks in your classroom.

### 6.3 Accurately measuring short lengths in both $\mathbf{c m}$ and mm

To measure accurately, the measuring instrument must be at 0 , if not, regard the starting point as 0.

In the example below, the strip starts at 1 to 4 , and it measures 3 cm


1. Read the lengths of the strips and record the lengths in both cm and in mm .
(a)

$7 \mathrm{~cm}=70 \mathrm{~mm}$
(b)

$5 \mathrm{~cm}=50 \mathrm{~mm}$
(c)

$5.5 \mathrm{~cm}=55 \mathrm{~mm}$

We can also record the length of an object with a combination of two different units. The ruler in 1 (c) is more than 5 cm but less than 6 cm long. It is 7 mm longer than 5 cm . We can therefore say that the bar is 5 cm and 7 mm or we can record it as 57 mm .

1. Study the following ruler and answer questions.

(a) What is the length of the bar using a combination of cm and mm ? 5 cm 7 mm
(b) What is the length of the bar in mm ?

57 mm
2. First estimate the centimetre length of each of the objects indicated in the table that follows. Then measure each object with an appropriate instrument. Complete this table. Accept any reasonable response.

| Item | Estimation | Actual Measurement |
| :--- | :--- | :--- |
| lead pencil |  |  |
| DBE text book |  |  |
| Desk |  |  |
| Classroom wall, |  |  |
| Height of the door |  |  |
| The total distance <br> around the schoolyard. |  |  |
| the distance around a <br> R5 coin |  |  |

3. Estimate the distance between your own town and the nearest town. Accept any reasonable response.
4. Record accurate reading from the figures below.


| Units | Long pencil | Short pencil |
| :--- | :--- | :--- |
| mm | 80 mm | 35 mm |
| cm | 8 cm | $3,5 \mathrm{~cm}$ |

### 6.4 Writing lengths in different units

You already know the following:
There are 10 millimetres in 1 centimetre.
There are 100 centimetres in 1 metre.
There are 1000 metres in 1 kilometre.
This makes it easy to convert from one unit to another, because each unit is 10 , 100 or 1000 times as large or as small as another unit in the system.
$1 \mathrm{~m}=1000 \mathrm{~mm}$ and $1 \mathrm{~km}=1000 \mathrm{~m}$
$1 \mathrm{~cm}=10 \mathrm{~mm}$ and $1 \mathrm{~m}=100 \mathrm{~cm} / 1000 \mathrm{~mm}$

The illustration below shows how to convert between SI units, i.e. from bigger unit to smaller unit, use sign and vice versa.


1. How do you convert :
(a) centimetres to millimetres?
(b) millimetres to centimetres?
Multiply a quantity in cm by 10 .
(c) kilometers to metres?
(d) metres to kilometers?
(e) 5 cm to millimetres?
(f) 6 km to metres?
(g) 7500 m to kilometers?
Divide a quantity in mm by 10.
Multiply a quantity in km by 1000 .
Divide a quantity in metres by 1000.
Multiply 5 by 10 to get 50 mm .
Multiply 6 by 1000 to get 6000 m .
Divide 7500 by 1000 to get $7,5 \mathrm{~km}$.
2. Write the following lengths in millimetres:

| (a) 2 cm <br> $=20 \mathrm{~mm}$ | (b) 23 cm <br> $=230 \mathrm{~mm}$ | (c) one half <br> centimetre <br> $=5 \mathrm{~mm}$ | (d) one fifth of a <br> metre <br> $=200 \mathrm{~mm}$ |
| :--- | :--- | :--- | :--- | :--- | :--- |

3. Write the following lengths in metres:

| (a) 400 cm <br> $=4 \mathrm{~m}$ | (b) 4000 mm <br> $=4 \mathrm{~m}$ | (c) 1050 cm <br> $=10,5 \mathrm{~m}$ | (d) 10000 cm <br> $=100 \mathrm{~m}$ |
| :--- | :--- | :--- | :--- |

4. Write the following lengths in metres:

| (a) 25 km <br> $=25000 \mathrm{~m}$ | (b) 14 km <br> $=14000 \mathrm{~m}$ | (c) 1 km <br> $=1000 \mathrm{~m}$ | (d) $\frac{1}{4} \mathrm{~km}$ <br> $=250 \mathrm{~m}$ |
| :--- | :--- | :--- | :--- |

5. Write the following lengths in kilometres:

| (a) 7000 m <br> $=7 \mathrm{~km}$ | (b) 26000 m <br> $=26 \mathrm{~km}$ | (c) 1500 m <br> $=15 \mathrm{~km}$ | (d) 10000 m <br> $=10 \mathrm{~km}$ |
| :--- | :--- | :--- | :--- |

### 6.5 Ordering and comparing lengths

In order to arrange length of shapes or objects in any order, the units must be the same

Example: Order the following lengths from highest to lowest
643 cm; 2 m; 87000 mm; 34 m

| 634 cm | 2 m | 87000 mm | 34 m |
| :--- | :--- | :--- | :--- |


| 6430 mm | 2000 mm | 87000 mmm | 34000 mm |
| :--- | :--- | :--- | :--- |

Answer: 87000 mm; 34 m; 634 cm; 2 m
In order to order lengths, convert all lengths to a single unit.

1. Order the following numbers from the smallest to the largest.
(a) $643 \mathrm{~cm} ; 1212 \mathrm{~m} ; 870 \mathrm{~mm} ; 34 \mathrm{~m}$ $870 \mathrm{~mm} ; 643 \mathrm{~cm} ; 34 \mathrm{~m} ; 1212 \mathrm{~m}$
(b) $556 \mathrm{~cm} ; 112 \mathrm{~km} ; 861490 \mathrm{~cm} ; 0,5 \mathrm{~km}$ $556 \mathrm{~cm} ; 0,5 \mathrm{~km} ; 861490 \mathrm{~cm} ; 112 \mathrm{~km}$
(c) $20000 \mathrm{~m} ; 25 \mathrm{~km} ; 150000 \mathrm{~cm}$ 150000 cm; 20000 m; 25 km

### 6.6 Rounding off

1. Round off to the nearest 100 :

| $78 \mathrm{~cm} \sim 100 \mathrm{~cm}$ | $163 \mathrm{~cm} \sim 200 \mathrm{~cm}$ | $896 \mathrm{~m} \sim 1000 \mathrm{~mm}$ | $56083 \mathrm{~cm} \sim 56000 \mathrm{~cm}$ |
| :--- | :--- | :--- | :--- |

2. Round off to the nearest 1000 :

| 2740 cm | 4590 cm | 1958 m | 890 mm |
| :--- | :--- | :--- | :--- |
| $\sim 3000 \mathrm{~cm}$ | $\sim 5000 \mathrm{~cm}$ | $\sim 2000 \mathrm{~m}$ | $\sim 1000 \mathrm{~mm}$ |

## TERM

## UNIT 1

## WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

### 1.1 Counting, ordering, comparing, representing and place value

## Counting forwards and backwards in 50's and 100's from 0 to 9000.

1. Fill in the missing numbers by Counting forward in fifties from 2450 until you reach 3200.

2 450; 2 500; 2 550; 2 600; 2 650; 2 700; 2 750; 2 800; 2 850; 2 900; 2 950; 3 000; 3 050; 3 100; 3 150; 3200
2. Count backwards in 100's.

7 250; 7 150; 7 050; 6 950; 6 850; 6 750; 6 650; 6 550; 6450; 6 350; 6250
3. Count forwards in 50s from 2133 to 2333. 2 133; 2 183; 2 233; 2 283; 2333
4. Count backwards in fifties from 3250 to 2950.

3 250; 3 200; 3 150; 3 100; 3 050; 3 000; 2950

## Representing and place value of numbers up to 5-digits

1. Write the digits of the following numbers in their correct columns:

| Number | Ten <br> Thousands | Thousands | Hundreds | Tens | Ones |
| :--- | :---: | :---: | :---: | :---: | :---: |
| 1547 |  | 1 | 5 | 4 | 7 |
| 56283 | 5 | 6 | 2 | 8 | 3 |
| 7291 |  | 7 | 2 | 9 | 1 |
| 63243 | 6 | 3 | 2 | 4 | 3 |
| 8010 |  | 8 | 0 | 1 | 0 |

2. What is the place value of the underlined digit?
(a) $1 \underline{2} 456$
(b) $25 \underline{48}$
Thousands
Tens
(c) 25638
(d) 40052
(e) $35 \underline{2} 84$

Ones
Ten thousands

## Hundreds

3. What is the value of the digit 6 in these numbers?
(a) 78062
60
(b) 64100 60000
(c) 34576 6
(d) 16002 6000
(e) 98623 600

## Ordering

1. Arrange these numbers from smallest to biggest:

3 648; 3 684; 3 468; 3 864; 3486.
3 468; 3 486; 3 648; 3 684; 3864
2. Arrange these numbers from biggest to smallest.

98 210; 97 885; 94 010; 99 900; 95 610; 98589.
99 900; 98 589; 98 210; 97 885; 95 610; 94010

## Comparing

The < sign for "smaller than" can be used to state that one number is smaller than the other. For example, we can write $25<27$ and $2695<8981$. The $>$ sign for "bigger than" can be used to state that one number is bigger than the other. For example, we can write $27>25$ and $5579>3579$. Notice that the open part of the sign is always towards the bigger number.

1 Use the " $<$ or $>$ "sign to compare the following whole numbers.
(a) $53492>19002$
(b) $26768<26879$
(c) $12901>12899$
(d) $75536>75355$

### 1.2 Odd and even numbers

All the numbers that end with $1,3,5,7$ or 9 cannot be divided into two equal groups or cannot be halved or cannot be divisible by 2 and are called odd numbers. All the numbers that end with $0,2,4,6$, or 8 can be divided into two equal groups or can be halved or can be divisible by 2 and are called even numbers.

1. Select all the odd numbers in the set of numbers below:


### 1.3 Multiples and factors

The number 12 can be obtained by calculating $3 \times 4$.
We can say:

- 12 is the product of 3 and 4 .


## MULTIPLES OF 12

$$
\begin{aligned}
& 12 \times 1=\mathbf{1 2} \\
& 12 \times 2=\mathbf{2 4} \\
& 12 \times 3=\mathbf{3 6} \\
& 12 \times 4=\mathbf{4 8}
\end{aligned}
$$

FACTORS OF 12

$\begin{array}{llllll}1 & 2 & 3 & 4 & 6 & 12\end{array}$分

- 12 is a multiple of 3 and 3 is a factor of 12
- 12 is also a multiple of 4 and 4 is a factor of 12

1. What are the first ten multiples of:
(a) $2\{2 ; 4 ; 6 ; 8 ; 10 ; 12 ; 14 ; 16 ; 18 ; 20\}$
(b) $3\{3 ; 6 ; 9 ; 12 ; 15 ; 18 ; 21 ; 24 ; 27 ; 30\}$;
(c) $6\{6 ; 12 ; 18 ; 24 ; 30 ; 36 ; 42 ; 48 ; 54 ; 60\}$
(d) $8\{8 ; 16 ; 24 ; 32 ; 40 ; 48 ; 56 ; 64 ; 72 ; 80\}$
(e) $10\{10 ; 20 ; 30 ; 40 ; 50 ; 60 ; 70 ; 80 ; 90 ; 100\}$
2. Which of the following numbers in the shape are multiples of 4 ?

3. Write down all the factors of:
(a) $36 \quad\{1 ; 2 ; 3 ; 4 ; 6 ; 9 ; 12 ; 18 ; 36\}$
(b) $54 \quad\{1 ; 2 ; 3 ; 6 ; 9 ; 18 ; 27 ; 54\}$
(c) $51 \quad\{1 ; 3 ; 17 ; 51\}$
(d) $98 \quad\{1 ; 2 ; 7 ; 14 ; 49 ; 98\}$
(e) $115 \quad\{1 ; 5 ; 23 ; 115\}$

## UNIT 2:

## NUMBER SENTENCES

### 2.1 Open and closed number sentences

If something is not true, we say it is false.


For example, this sentence is false: All birds have eight legs.

Sentences such as the following are called number sentences:
The number sentence below is incomplete. One of the numbers is missing.

$$
9+4=7+?
$$

An incomplete number sentence is also called an open number sentence.
The number 6 will make the above number sentence true: $9+4=7+6$

The sentence $9+4=7+6$ is called a closed number sentence. Instead of a question mark, a little block $\square$ or dots . . . or the word number may be used to write an open number sentence:

$$
9+4=7+\ldots \text { or } 9+4=7+\text { a number or } 9+4=7+
$$

1. Complete the following number sentences:
(a) $6+4=8+2$
(b) $90+10=80+20$
(c) $20+60=10+50+20$
(d) $800+200=1000$
(e) $130+15=110+35$
(f) $360+640=1000$
(g) $487+163=650$

### 2.2 Properties of whole numbers

When a number is multiplied by 1 , the answer is the number itself. This is called the multiplicative property of 1.

Example: $37 \times 1=37$.
When 0 is added to a number, the answer is the number itself. This is called the additive property of 0 .

Example: $37+0=37$.
When you subtract the same number from itself, the answer is zero. This is called the Identity element of 0

Example: $15-15=0$
Commutative property of addition - Numbers can be added in any order.
Example: $12+13=13+12$
Commutative property of multiplication - Numbers can be multiplied in any order.

Example: $6 \times 8=8 \times 6$

1. Complete the following:
(a) $25+20=20+25$
(b) $33-33=0$
(c) $7 \times 11=11 \times 7$
(d) $18+0=18$
(e) $41-41=0$
(f) $10 \times 30=30 \times 10$
(g) $16+0=16$
(h) $52 \times 1=52$
(i) $0+2=2+0$
(j) $8-8 \ldots=0$

### 2.3 Inverse operations

## Addition and subtraction as inverse operations

This means that subtraction is the opposite of addition.
Addition can be used to check subtraction
Example: $45+12=57$ therefore $57-12=45$

## Multiplication and division as inverse operations

Division statement can be changed to a multiplication statement.
Example: $36 \div 12=3$ can be changed into $3 \times 12=36$

1. Complete the following
(a) $15+11=26$
therefore
$26-11=15$
(b) $10 \div 5=2$
therefore
$2 \times 5=10$
(c) $51 \div 17=3$
(d) $26+13=39$
therefore
$3 \times 17=51$
(e) $9 \times 6=54$
therefore $\quad 39-13=26$
therefore
$54 \div 9=6$
(f) $78-18=60$
therefore
$60+18=78$

## UNIT 3:

## WHOLE NUMBERS: ADDITION AND SUBTRACTION

### 3.1 Rounding off to the nearest 1000 to estimate answers

## Example 1

When estimating answers first round off the numbers and add or subtract the rounded numbers.
$2345+4858=2000+5000$

$$
=7000
$$

## Example 2

$6745-3245=8000-3000$

$$
=5000
$$

1. Estimate the answers to the following:
(a) 7178 - 3535

$$
\begin{aligned}
& =7000-4000 \\
& =3000
\end{aligned}
$$

(b) $7834+1188$
$=8000+1000$
= 9000
(c) $9062-5368$
= $9000-5000$
$=4000$
(d) $6771+2869$

$$
\begin{aligned}
& =7000+3000 \\
& =10000
\end{aligned}
$$

(e) $2384+6297$
$=2000+6000$
$=8000$
(f) 6572-1944
= 7 000-2000
$=5000$
(g) $3902+2869$
$=4000+3000$
$=7000$
(h) $7869-2543$
$=8000-3000$
$=5000$
(i) $1795+2947$
$=2000+3000$
$=5000$

### 3.2 Expanded column method

## Examples:

$$
5632+2476=\quad \begin{aligned}
5362 & =5000+300+60+2 \\
2476 & =\underline{2000+400+70+6} \\
& =7000+700+130+8
\end{aligned}
$$

Since 130 is in the place value of tens, it needs to be expanded to have $100+$ 30 and transfer the 100 to 700

$$
\begin{aligned}
& =7000+(700+100)+30+8 \\
& =7000+800+30+8 \\
& =7838
\end{aligned}
$$

(a) $7445-3274=$

$$
\begin{array}{r}
7445=7000+400+40+5 \\
-3274=\underline{3000+200+70+4}
\end{array}
$$

But 40 is less than 70 therefore we need to transfer 100 from 400 to have 140

$$
\begin{aligned}
7445 & =7000+300+140+5 \\
-3274 & =3000+200+70+4 \\
7445-3274 & =4000+100+70+1 \\
& =4171
\end{aligned}
$$

1. Calculate:
(a) $6420+3364$

$$
\begin{aligned}
6420 & =6000+400+20+0 \\
+3364 & =\underline{3000+300+60+4} \\
& =9000+700+80+4 \\
& =9784
\end{aligned}
$$

(b) $9580-2450=7130$
(c) $7255+1260=8515$
(d) 4457-2325 = 2132
(e) 2 842-1651 = 1191
(f) $2948+1033=3981$
(g) $1931+1077=3008$
(h) $3100-2800=300$

### 3.3 Using a calculator

1. Use the calculator to calculate the following
(a) $3812+2163=2163$
(b) $4523-3439=1084$
(c) $6605+4251=10856$
(d) $5032-3810=1222$
(e) $3653+2435=6088$
(f) $4528-3452=1076$
(g) $5437+4472=965$
(h) $7205-1363=5842$

## UNIT 4:

## PROPERTIES OF 2-D SHAPES

### 4.1 Recognise, classify and name 2-D shapes

A two dimensional (2-D) shape is a closed flat plane figure that does not have any thickness. It cannot be physically held. It can have curved, straight or a combination of curved and straight sides.
Examples:


1. Identify whether the following shapes are two-dimensional (2-D) or not. Choose the most appropriate answer.

| NO | FIGURE | $\begin{gathered} \text { 2-D } \\ \text { shape? } \end{gathered}$ | $\begin{aligned} & \text { Straight } \\ & \text { sides only } \end{aligned}$ | $\begin{gathered} \text { Curved } \\ \text { sides only } \end{gathered}$ | Straight and curved |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Yes or no | Tick the most correct answer. |  |  |
| (a) | $\bigcirc$ | Yes |  | $\checkmark$ |  |
| (b) | $>$ | Yes | $\checkmark$ |  |  |
| (c) | $\square$ | Yes | $\checkmark$ |  |  |
| (d) |  | Yes |  | $\checkmark$ |  |
| (e) | $4^{2}$ | Yes | $\checkmark$ |  |  |
| (f) |  | Yes |  |  | $\checkmark$ |
| (g) |  | Yes | $\checkmark$ |  |  |
| (h) | $\square$ | Yes |  |  | $\checkmark$ |

Figure B, C and E are closed shapes bounded by straight lines. They are called polygons.
2. Study the following diagrams and colour in those that are polygons.


## Naming polygons

We name polygons according to the number of straight sides they have. The shapes below have been named using words derived from Latin or Greek words.

| No. | Shape | Number <br> of sides | Derived <br> from | Name |
| :--- | :--- | :--- | :--- | :--- |
| (a) | Thatin: tri <br> - three | Triangle |  |  |
| (b) |  | Latin: <br> quadri - <br> four | Quadrilateral |  |
| (c) |  | Greek: <br> pent - <br> five | Pentagon |  |
| (e) |  | Greek: <br> hexa - <br> six | Hexagon |  |

1. In the following diagram, all the numbered shapes have straight lines.


Complete the table using the shapes in the house.

| SHAPE | NUMBER OF SIDES | NAME OF THE SHAPE |
| :---: | :---: | :---: |
| A | 6 | Hexagon |
| B | 4 | Quadrilateral |
| C | 3 | Triangle |
| D | 3 | Triangle |
| E | 4 | Quadrilateral |
| F | 5 | Pentagon |
| G | 4 | Quadrilateral |
| H | 7 | Heptagon |

### 4.2 Regular and irregular polygons.

Polygons are grouped according to their sides and angles Regular polygon are polygons with ALL sides and angles equal. Irregular polygons are polygons with sides and angles unequal.

## Examples:

| Regular polygons | Irregular polygons |
| :---: | :---: |
| $\square$ |  |

1. Sort the following shapes according to regular and irregular polygons by writing only the letter of the shape.


| REGULAR | IRREGULAR |
| :---: | :---: |
| C | $\mathrm{A} ; \mathrm{B} ; \mathrm{D} ; \mathrm{E} ; \mathrm{F} ; \mathrm{G} ; \mathrm{H}$ |

All shapes that are four-sided are called quadrilaterals. Quadri- is a Latin word meaning four and lateral means sides.

## Example:



## Angles

When two straight lines meet, an angle is formed. The two lines that meet to form an angle are called arms.


The size of an angle depends on the distance between the two arms. A square and a rectangle are special quadrilaterals because they both have equal angles that are called right angles.


To determine if the angle is a right angle or not one can use corners of a sheet of paper that has been folded two times as shown in the diagrams.


To measure an angle, we place the corner of the folded paper on the angle in a shape and check if it is equal to a right angle, smaller than a right angle or bigger than a right angle. If we want to measure the size of angle $z$, we can put a folded paper with a right angle on top of the angle as shown in the diagram.


Hint: Use a folded piece of paper to check your answer.

(a) B; E; G; are right angles.
(b) F; are smaller than a right angle.
(c) A; C; D; are greater than a right angle.

### 4.3 Similarities and differences between a square and rectangles.

1. Look at these shapes and identify the similarities and differences with special focus on angles and sides.


Complete the table (where possible)

| Similarities | Differences |
| :--- | :--- |
| (a) Right angles | All sides equal in a square while the <br> pair of opposite sides are equal in a <br> rectangle. |
| (b) Opposite sides equal |  |

## UNIT 5

## SYMMETRY

### 5.1 Recognise and describe lines of symmetry

Symmetry occurs when a shape or design can be imagined as consisting of two "mirror halves". Stated differently, for any symmetrical shape we can imagine a line, called the line of symmetry. It passes through the shape in such a way that if we fold along the line, every single line and point on one side of the line of symmetry lies on top of its twin on the other side of the line of symmetry - without exceptions.

A line of symmetry is a line that cuts a shape exactly in the middle. If you fold the shape along the line, both halves would match exactly. If you place a mirror along the line, the shape would remain unchanged.


Front view


Side view

If you fold the picture of the front view of the house on the red line, the part that is on the left of the line will fold exactly onto the part that is on the right of the line.


The front view of this house is symmetrical. It has one line of symmetry. The side view is symmetrical. Each front window of the house is also symmetrical, and has two symmetrical lines.

## Square:



## Other shapes:



1. Take a paper that was cut to form a square and fold it is the middle. Open it and draw a line on the fold. See how many lines of symmetry you get.
Remember the mirror image. Practical Activity
2. Which of the following shapes does not have a line of Symmetry?


| Line(s) of Symmetry | No lines of Symmetry |
| :--- | :--- |
| B; D | A; C; F; |

### 5.2 Draw lines of symmetry

1. Draw the line(s) of symmetry:


## UNIT 6:

## DRAWING OF 2-D SHAPES

### 6.1 Draw 2-D shapes

It is easier to draw 2-D shapes on a grid paper. It makes shapes more accurate.

1. Draw an example of each of the following on a square grid:
a) square
b) rectangle
c) triangle
d) pentagon
e) heptagon
f) hexagon


### 6.2 Create shapes on geoboards

We can create 2-D shapes using a string and a geoboard as shown in the picture.


1. Create any 2-D shape using a geoboard like the one below. Ensure that you create at least 5 different shapes. [Any suitable shape]


### 6.3 Building composite shapes

A composite shape is any shape that is made up of two or more geometric shapes such as triangles, squares, rectangles, etc. It is also called a compound shape.

2. Draw any 4 composite shapes on the grid provided.


## UNIT 7:

## TRANSFORMATIONS

### 7.1 Composite shapes and tessellations

Transformation is a way of moving a shape or an object to another position or changing the size of the shape. During transformation, the position of the shape or object changes and not the shape. The Commonly used transformations are those that involve the change of position such as rotations (turn), translation (slide) and reflection (flip). Shapes can be put together to build composite shapes by tessellating shapes and by packing tangram pieces.

## Tessellation

Tessellation is a tiling pattern. We say shapes tessellate when they are fitted together without using any gaps in between. The example below shows a tessellation of hexagons.


1. Study the following figures and answer the questions.

| Figure A | Figure B |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | $\|l\| l\|l\| l\|l\|$  <br>   <br>   <br>   <br>   <br>   |  |  |  |  |

(a) Identify the smaller shapes that make figure $A$
(b) Identify the smaller shapes that make figure $B$
(c) Have the shapes in figures $A$ and $B$ tessellated or not Yes
(d) What is the name of Figure A?
(e) What is the name of Figure B?

Triangles
Squares

Hexagon
Quadrilateral
2. Each figure in the square grid is made of shapes indicated by different colours.

(f) Name each figure
(g) Identify the shapes that made each figure

Fig 1 - squares
Fig 2 - rectangles
Fig 3 - rectangle and triangles
(h) How many lines of symmetry are there in each figure?

Fig 1 - 1
Fig 2-4
Fig 3-1

## Tangram

We can also use tangram pieces to make new shapes. A tangram is a puzzle made up of triangle, a square and a rhombus cut out of a bigger square. It has seven (7) shapes altogether.
3. Label the shapes in the following tangram.

triangle
square
parallelogram
4. Use ALL your tangram pieces to make the pictures shown below.


### 6.7 Describing patterns

Patterns can be described by talking about the shapes or symmetry that is seen on the pattern e.g. the pattern on the tiled floor is a tessellation of rectangles or squares

## Example

## The pattern on the figure

 is made of curved lines1. Identify the objects and describe how the following patterns were formed.

|  |  |  |
| :---: | :---: | :---: |
| Figure 1 | Figure 2 | Figure 3 |
| Honeycomb - translation | Butterfly - reflection | Brick Wall - translation |

## UNIT 8

## POSITIONS AND MOVEMENT

### 8.1 Locate objects using alpha-numeric grid referencing:

Cells in a grid are often labelled with a letter and a number e.g. D4; A3; E7. This is called alpha-numeric referencing.

1. Use the grid below to locate the objects in the given positions

| 8 |  | Pentagon |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 7 | Circle |  |  |  |  |
| 6 |  |  |  |  |  |
| 5 |  |  | Sun |  |  |
| 4 |  |  | Dog |  |  |
| 3 |  |  |  |  | Car |
| 2 |  |  |  |  | Hexagon |
| 1 | Triangle |  |  | Square |  |
|  | A | B | C | D | E |

(a) $4 \mathrm{C}=\operatorname{dog}$
(b) $1 \mathrm{D}=$ square
(c) 7A = circle
(d) $3 \mathrm{E} \quad=$ car
(e) $8 \mathrm{~B}=$ pentagon
(f) $5 \mathrm{C}=$ the sun
(g) $2 \mathrm{E}=$ hexagon
(h) $1 \mathrm{~A}=$ triangle
2. The grid below shows where different learners sit in a classroom.

| 8 |  |  | BOARD | TEACHER'S <br> TABLE | CUPBOARD |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 7 | SOPHIA |  |  |  |  |
| 6 |  |  | MIRRIAM | JACK |  |
| 5 |  |  |  |  | PHIL |


| 4 |  | YOU |  | NARE | LERATO |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 3 |  |  <br> GERT | NATHI |  |  |
| 2 |  <br> BUSI | SIBUSISO |  |  |  |
| $\mathbf{1}$ |  |  | JULIUS |  | MPHO |
|  | A | B | C | D | E |

(a) Describe in words where you sit in the classroom.

Column B row 4
(b) Describe where Nathi sits.
(c) Describe where Phil sits.
(d) Describe where the teacher's table is.

Column C row 3
Column E row 5
Column D row 8
3. The following grid has 8 rows marked 1 to 8 from the bottom to the top. Study the grid and answer the questions that follow if Jack sits in D6.

| 8 |  |  | BOARD | TEACHER'S <br> TABLE | CUPBOARD |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 7 | SOPHIA |  |  |  |  |
| 6 |  |  | MIRRIAM | JACK |  |
| 5 |  |  |  |  | PHIL |
| 4 |  | YOU |  | NARE | LERATO |
| 3 |  |  <br> GERT | NATHI |  |  |
| 2 |  <br> BUSI | SIBUSISO |  |  |  |
| $\mathbf{1}$ |  | B | JULIUS |  | MPHO |
|  | A | C | D | E |  |

(a) In which column, and in which row does Lerato sit? Column E row 4
(b) In which column and in which row do these learners sit?

| Sophia <br> column A row 7 | Busi <br> column A row 2 | Mirriam <br> column C row 6 |
| :--- | :--- | :--- |
| Nare <br> column D row 4 | Sally <br> column B row 3 | Gert <br> column B row 3 |

(c) Who sits in Cell A2?
(d) In which cell is the board? Nkosi and Busi
(e) In which cell is the cupboard?

C8
E8
4. The following grid shows alpha-numeric directions. Study the grid and answer the questions that follow.

| 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 9 | 110 | 120 | 130 | 140 | 150 | 260 | 170 | 180 | 190 | 200 |
| 8 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 |
| 7 | 310 | 320 | 330 | 340 | 350 | 360 | 370 | 380 | 390 | 400 |
| 6 | 410 | 420 | 430 | 440 | 450 | 460 | 470 | 480 | 490 | 500 |
| 5 | 510 | 520 | 530 | 540 | 550 | 560 | 570 | 580 | 590 | 600 |
| 4 | 610 | 620 | 630 | 640 | 650 | 660 | 670 | 680 | 690 | 700 |
| 3 | 710 | 720 | 730 | 740 | 750 | 760 | 770 | 780 | 790 | 800 |
| 2 | 810 | 820 | 830 | 840 | 850 | 860 | 870 | 880 | 890 | 900 |
| 1 | 910 | 920 | 930 | 940 | 950 | 960 | 970 | 980 | 990 | 1000 |
|  | A | B | C | D | E | F | G | H | I | J |

(a) Find your destination if you move the following steps from positions F4.
N.B. The next move must be from the last move.
i. 2 blocks to the left,
ii. 3 blocks down,
iii. 6 blocks up and
iv. 3 blocks to the right to find your four destinations. 370
5. Use the following Map to answer the questions. Give the map references and province. (DBE workbook, Math Eng Gr4 B2 worksheet 134)

(a) Cow ?

D3 Free State
(b) Grapes?
(c) Fish ?
(d) Diamond?
(e) Elephant?
(f) Banana?

B5 Western Cape
D5 Eastern Cape
B3 Northern Cape
E1 Limpompo
E4 Kwazulu Natal

## UNIT 9:

## PROPERTIES OF 3-D OBJECTS

### 9.1 Classifying 3-D objects

A three-dimensional (3-D) object is an object around you that you can pick up, touch and move around. Objects can have curved surfaces only, flat surfaces only and curved and flat surfaces. All objects with flat surfaces are called polyhedra. A polyhedron is a three-dimensional object that consists of a collection of polygons that are joined at the edges. A flat surface is called a face. The points where edges meet are called vertices.


1. Group the following 3-D objects.


| Curved surfaces only | Flat and curved <br> surfaces | Flat surfaces only |
| :--- | :--- | :--- |
| A; C; H; | B; D; J | E; F; G; |

2. Circle the 3-D object that does not fit in each row. Name that 3-D object and give reasons why you say it does not fit
(a)


Sphere - curved
(b)


(c)


Cylinder- flat and curved

## Prisms and pyramids

Prisms and pyramids are polyhedrons. A prism is a polyhedron with more than three rectangles and two same polygons opposite to each other. The identical polygons upon which a prism is named are called "bases". A base can be any polygon and it does not refer to the face the object sits on. A prism is named using the two identical faces (bases) that are opposite each other. Other faces of a prism are rectangles or squares. A pyramid is a three-dimensional polyhedron with the base of a polygon along with three or more triangular-shaped faces that meet at a point.


1. Complete the table.

| Prism | Number of <br> faces | Shapes that make <br> up faces |
| :--- | :--- | :--- | :--- |
| Triangular prism | 5 | 2 triangles <br> 3 rectangles |
| Hectangular prism | 6 | 6 rectangles |

## Pyramids

A pyramid is a three-dimensional polyhedron with the base of a polygon along with three or more triangular-shaped faces that meet at a point.

|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |

## Naming pyramids

A pyramid has one base and it is named using the shape of its base.

1. Complete the table.

| Pyramids | Name | Number <br> of faces | Shapes that make up faces |
| :--- | :--- | :--- | :--- |
| Sriangular pyramid | 4 | 4 triangles |  |
| Hexagonal pyramid | 5 | 1 square <br> 4 triangles |  |
| Heptagonal pyramid | 8 | 5 triangles <br> 1 pentagon |  |

2. Identify the labelled three-dimensional objects and name them.


| Object | Name |
| :--- | :--- |
| A; B | Hexagonal pyramid |
| B | Rectangular pyramid |
| C | Hexagonal prism |
| D | Rectangular/Square prism |
| F | Cylinder |
| H | Sphere |

### 9.2 Make 3-D models using cut-out polygons

1. Bring along any 3-D object to school and complete the following steps.

Step 1: Cut the object along the edges to get the polygons that make up that object.

Step 2: Swap the polygons (pieces) of the object with another classmate.
Step 3: Make a 3-D model using the polygons that you got from another
group
Step 4: Name the 3-D model you made.
. (Accept any correct answer)
2. Make a triangular prism using the pieces you got from your teacher.

(a) What kind of surfaces does this object have? Flat surfaces
(b) Would it roll the object formed by these faces or slide it? Slide
(c) What is a face?

The flat surface of a 3 D object
(d) How many faces does it have? 5
(e) What shapes make a triangular prism?

Triangles and rectangle

## UNIT 10:

## VIEWING OF OBJECTS

Every object can be seen in a different way, depending on the position where you are.

### 10.1 Match different views of everyday objects

1. Nathi, Lebogang, Peter and Miriam sit around a table.


Each of the four friends makes a drawing of how they see the teapot from where they sit. Who drew which picture?

| Nathi | Peter | Miriam |
| :---: | :---: | :---: |

2. Write the position of the view of the car, using: Front, back, left side, right side, top


### 10.2 Identify everyday objects from different views

1. Draw floor plan of your classroom.

Different floor plans for different classrooms
Below is an example of a classroom (top view).

2. Study the diagram of the following object.

(a) Use grid paper to draw the i) front, ii) top view iii) left and iv) back of the object.

(b) After the drawing of the views, discuss and reflect on the transformations that you used to draw the different views (Discussions)
3. Nathi, Lebogang, Peter, Miriam and Bonga all look at the same house. This is what each one sees?

Nathi


Bonga

Lebogang


Miriam


Peter

Where were they when they looked at the house?
(a) Nathi

Left side
(b) Lebogang

Front
(c) Bonga

Above
(d) Miriam

Right side
(e) Peter

Back

## UNIT 11:

## PERIMETER, AREA AND VOLUME

### 11.1 Perimeter:

Perimeter is the total length around the shape. The perimeter can be measured around a shape or object using a measuring tape or a ruler and. In a case where the sides are given, the sum of sides gives the perimeter In the figure below, add the lengths of all the sides:


Answer: $10 \mathrm{~mm}+7 \mathrm{~mm}+5 \mathrm{~mm}+13 \mathrm{~mm}=35 \mathrm{~mm}$
Note: the answer you get is called Perimeter.

1. Measure all the sides using a ruler. Add all the lengths.

2. The following figures are maps of different plots of land. Calculate the perimeter of each plot and state your answer in the unit used on the map.
(a)


$$
\begin{aligned}
& \text { Perimeter }=150 \mathrm{~mm}+155 \mathrm{~mm}+155 \mathrm{~mm}+150 \mathrm{~mm}+155 \\
& \mathrm{~mm}+155 \mathrm{~mm}=920 \mathrm{~mm}
\end{aligned}
$$

(b)


Perimeter $=16 \mathrm{~km}+10 \mathrm{~km}+14 \mathrm{~km}+8 \mathrm{~km}=48 \mathrm{~km}$
(c)


$$
\text { Perimeter }=9680 \mathrm{~m}
$$

3. What is the total distance around these shapes if the side of each square is 1 unit?
(a)


16 units
(b) 14 units
(c)


12 units
(d)


1. if each side of a small square is 1 unit.

A. 14 units
B. 12 units
C. 20 units
D. 26 units

### 11.2 Area

Area is the space enclosed by a boundary in 2-D shape. Area is measured in square units such as square centimetres $\left(\mathrm{cm}^{2}\right)$, square metres $\left(\mathrm{m}^{2}\right)$ and square kilometres $\left(\mathrm{km}^{2}\right)$

The total number of squares in the figure determine the area of the figure.

1. Determine perimeter and the area of each figure below:

|  |  |  |  | Key: <br> square unit |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |
|  |  |  |  |  |
| Figure 1 | Figure 2 | \begin{tabular}{\|l|l|l|l|}
\hline
\end{tabular} |  |  |
|  |  | Figure 3 | Figure 4 |  |


| Figure | Perimeter | No of square units |
| :---: | :--- | :--- |
| 1 | 8 units | 4 square units |
| 2 | 12 units | 8 square units |
| 3 | 14 units | 12 square units |
| 4 | 16 units | 11 square units |

2. How many square units will it take to cover these shapes?
(a)


10 square units
(b)

$\qquad$ square units
(d)


16 square units
3. How many square units will it take to cover the unshaded part below?


## Shapes with curved sides

When we calculate the area on a given curved shape, we always approximate since it will be in between the two square unit values of the polygonal shapes.


- Count the number of yellow square units $=53$
- Count the number of green square units $=32$
- Add all (yellow and green) square units $=53+32=85$ square units

Then we can say the area of the curved shape (circle) will be between 53 and 85 square units

1. Determine the area of the curved shape.
(a)


Between 19 and 22 square units
(b)


Between 24 and 28 square units
(c)


Between 18 and 20 square units
11.3 Volume

- Making stacks with cubes or rectangular prisms

How many cubes do you need to fill this box?


- The capacity of a container tells us how much space the container has.
- The volume of an object tells us how much space the object takes up.


## Example:



There are 60 small cubes in this stack.
$\therefore$ The volume of the stack is 60 cubes


This stack of cubes fits exactly into the yellow box and fills the yellow box.
$\therefore$ The capacity of the box is 60 cubes

1. How many cubes in each figure?
(a)

(b)

15 cubes
(c)

10 cubes
(d)

30 cubes
(e)

2. How many cubes do you need to build a stack that is 3 cubes wide and 5 cubes long and 5 cubes high? 75 cubes
3. How many cubes do you need to build a stack that is 4 cubes wide, 6 cubes long and 7 cubes high? 168 cubes

## TERM

## UNIT 1

## WHOLE NUMBERS: COUNTING, ORDERING, COMPARING, REPRESENTING AND PLACE VALUE

### 1.1 Revision

1. Write the number symbols for the following numbers and arrange them from smallest to biggest.
(a) six thousand three hundred -6300
(b) five thousand and thirty

- 5030
(c) seven thousand and sixty six
- 7066
(d) seven thousand and six
- 7006
(e) five thousand one hundred
- 5100
(f) five thousand two hundred and fifty
- 5250

5 030; 5 100; 5 250; 6 300; 7 006; 7066 [from smallest to largest]
2. Answer the following questions
(a) Consider this number: 85450
i. Count forwards in 50s and then in 100s from the given number. NB: Write the next three numbers. 85 450; 85 500; 85 550; 85600 85 450; 85 550; 85 650; 85750
ii. Count backwards in 50 s and then in 100s from the given number. NB: Write the next three numbers.
85 450; 85 400; 85 350; 85300 85 450; 85 350; 85 250; 85150
iii. Express the number in expanded notation.
$85450=80000+5000+400+50$
(b) In each case, write $>$ or $<$ between the two numbers.
i. 2897 and 2289
2897 > 2289
ii. 4294 and 4492
$4294<4492$
iii. 21890 and 22089
$21890<22089$
iv. 35362 and 35263
$35362>35263$
(c) Write down the expanded notation of each number:
i. 2568
$2000+500+60+8$
ii. 86652
$80000+6000+600+50+2$
iii. 15504
$10000+5000+500+4$
iv. Three thousand eight hundred and seventy-four $3000+800+70+4$
v. Sixty two thousand two hundred and fifty-nine $60000+2000+200+50+9$
vi. Ninety eight thousand four hundred and twenty-three $90000+8000+400+20+3$

## UNIT 2

## WHOLE NUMBERS: ADDITION AND SUBTRACTION

### 2.1 Revision

1. Calculate the following by using a calculator
(a) $8867+7968$ 16835
(b) $5886+8657$ 14543
(c) $6783+8894$

15677
(d) $5378+8257$ 13657
(e) $6756-2354$

3402
(f) $12785-6432$ 6353
(g) 6896-1635

5261
(h) $7657-3434$

4223
2. Estimate the answer by first rounding off and then calculate the answer.
(a) 5242-2135 Estimate: 5200-2100=3100 Answer: 3107
(b) $2363-1057$
(c) $2748+3887$
(d) $4678+6846$

Estimate: $2400-1100=1300$ Answer: 1306
Estimate: $2700+3900=6600$ Answer: 6635
Estimate: $4700+6800=11500$ Answer: 11524
(e) 6 843-1 028

Estimate: $6840-1030=5810$ Answer: 5815
(f) $7654+6956$

Estimate: $7700+7000=14700$ Answer: 14610
3. Solve the following problems.
(a) Thandeka is buying a building material for R6 355. She has already paid the hardware R5 450. How much does she still have to pay? R6 355 - R5 450 = R905 She still has to pay R905
(b) Vusi bought a bike for R8 400. He borrowed money and he has already paid back R5 500. How much does he still have to pay? R8 400 - R5 $500=$ R2 $900 \quad$ He still needs to pay R2 900
(c) A car dealer bought a good second-hand $4 \times 4$ vehicle for R5 658 and sold it for R1 300 more. What was the selling price of the vehicle?
$R 5658+R 1300=R 6958 \quad$ The selling price is R6 958
(d) During the winter, 5507 people in the city caught flu. In spring the number decreased to 1794 . By how much did the number decrease?
$5507-1794=3713 \quad$ The number decreased by 3713

## UNIT 3

## TEMPERATURE

### 3.1 Reading temperature measurement

When we talk about hotness or coldness, we are referring to a temperature.
When we say, "it is cold today", it is because our bodies are warmer than the environment. When we complain that it is too hot, it is because our bodies are colder than the environment.

We use an instrument called thermometer to measure temperature, with units called degrees Celsius ( ${ }^{\circ} \mathrm{C}$ ).

- The freezing point of pure water is $0^{\circ} \mathrm{C}$.
- The boiling point of pure water is $100^{\circ} \mathrm{C}$, depending on the atmospheric pressure
- The average normal human body temperature is $37^{\circ} \mathrm{C}$

Thermometers measure temperature according to well-defined scales of measurement. Thermometer consists of a sealed glass tube that contains a liquid called mercury, that rises (expands) or falls (contracts) when temperature changes.


1. Study the following picture read over a week and then answer questions.


What was the temperature on:
(a) Monday?
(b) Tuesday?
(c) Wednesday?
(d) Thursday?
(e) Friday?
$33^{\circ} \mathrm{C}$
$2^{\circ} \mathrm{C}$
$21^{\circ} \mathrm{C}$ $29^{\circ} \mathrm{C}$ $12{ }^{\circ} \mathrm{C}$
2. The fluid in the tube (the red line) indicates the temperature reading in the thermometer. Match each temperature reading with one of the letters shown in the drawing below (A to J).

(a) $36{ }^{\circ} \mathrm{C}=\mathrm{A}$
(b) $35^{\circ} \mathrm{C}=\mathrm{E}$
(c) $39 \frac{1}{2}^{\circ} \mathrm{C}=\mathrm{H}$
(i) $37 \frac{1}{10}^{\circ} \mathrm{C}=\mathrm{F}$
(e) $41 \frac{8}{10}^{\circ} \mathrm{C}=\mathrm{J}$
(f) $40 \frac{1}{2}^{\circ} \mathrm{C}=\mathrm{C}$
(g) Two degrees below $40^{\circ} \mathrm{C}=\mathrm{B}$
(h) Three and a half degrees higher than $35 \frac{1}{2}^{\circ} \mathrm{C}=\mathrm{G}$
(i) $40 \frac{1}{4}{ }^{\circ} \mathrm{C}=1$
(j) Half a degree lower than $41 \frac{1}{2}^{\circ} \mathrm{C}=\mathrm{D}$

### 3.2 Reading calibrated instruments

1. Read these thermometers. Write down the temperature. Say if it is very cold, cold, cool, warm or very warm.
a.

b.
$\frac{\left[-4^{\circ} \mathrm{C}\right.}{\text { Verv cold }}$
c.
$=\frac{14^{\circ} \mathrm{C}}{\text { Cold }}$
d.
$=\frac{38^{\circ} \mathrm{C}}{\text { Very warm }}$
e. $=7^{\circ} \mathrm{C}$

|  |
| :---: |
|  |  |

(20
(

### 3.3 Recording and reporting on temperature measurements

When recording the different temperature readings, one must be accurate and consistent.
When weather temperature is recorded per day, there will be a highest (maximum) temperature and a lowest (minimum) temperature.

1. Record the minimum and maximum temperatures of your own environment/ town/city from Monday to Friday. Draw the table in your book and fill in each day's temperatures.
This activity needs to be monitored daily by the teacher. The responses should be based on the actual recorded temperature on each day.

| Days | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Min temperature |  |  |  |  |  |
| Max temperature |  |  |  |  |  |

(a) Compare the temperatures of the different days. How did the temperature change over the week?
(b) Which day had the lowest maximum temperature? What is the difference on maximum temperatures on Day 1 and Day 4?
(c) Calculate the difference in temperature between the minimum and maximum for each day.

### 3.4 Calculations and solving problems related to temperature

1. The table below shows the actual maximum and minimum temperatures on a day in July for a few towns.

| Town | Kuruman | Kimberly | Benoni | Richard's <br> Bay | King William's <br> town |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Min <br> temperature | $19^{\circ} \mathrm{C}$ | $20^{\circ} \mathrm{C}$ | $17^{\circ} \mathrm{C}$ | $19^{\circ} \mathrm{C}$ | $16^{\circ} \mathrm{C}$ |
| Max <br> temperature | $36^{\circ} \mathrm{C}$ | $30^{\circ} \mathrm{C}$ | $27^{\circ} \mathrm{C}$ | $26^{\circ} \mathrm{C}$ | $24^{\circ} \mathrm{C}$ |

(a) Compare the minimum temperatures of Richard's Bay and King William's town. How much colder was it in King William's town than in Richard's Bay on this day? King Williams's town was $3^{\circ} \mathrm{C}$ colder than Richard's Bay.
(b) Compare the maximum temperatures of Richard's Bay and King William's town. How much warmer was it in Richard's Bay than in King William's town on this day?

Richard's Bay was $2^{\circ} \mathrm{C}$ warmer than Kind William's town.
(c) Calculate the difference in temperature between the minimum and maximum for each town.

| Town | Kuruman | Kimberly | Benoni | Richard's <br> Bay | King William's <br> town |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Min <br> temperature | $19^{\circ} \mathrm{C}$ | $20^{\circ} \mathrm{C}$ | $17^{\circ} \mathrm{C}$ | $19^{\circ} \mathrm{C}$ | $16^{\circ} \mathrm{C}$ |
| Max <br> temperature | $36^{\circ} \mathrm{C}$ | $30^{\circ} \mathrm{C}$ | $27^{\circ} \mathrm{C}$ | $26^{\circ} \mathrm{C}$ | $24^{\circ} \mathrm{C}$ |
| Difference | $17^{\circ} \mathrm{C}$ | $8^{\circ} \mathrm{C}$ | $10^{\circ} \mathrm{C}$ | $7^{\circ} \mathrm{C}$ | $8^{\circ} \mathrm{C}$ |

(d) In which town was the difference between the minimum and maximum temperatures the smallest?

The difference is smallest in Richard's bay
(e) In which town did the temperature change the most between the minimum and maximum temperatures?
The temperature changed the most in Kuruman.

## UNIT 4

## CAPACITY/VOLUME

### 4.1 What is capacity? What is volume?

The cube below has side lengths of 5 . You can evenly stack 5 layers of unit cubes containing a total of 25 cubic units each into the cube as shown below:


Count how many cubes are used to fill a container. The volume of the container is stated cubes

The capacity of a container tells us how much space the container has.
The volume of an object tells us how much space the object takes up.

1. Answer the following questions based on the diagram below:

(a) What is the volume of the stack inside the blue box?
$(8 \times 3 \times 4)+(6 \times 2 \times 4)+(5 \times 4 \times 4)=96+48+80=224$ cubic units
(b) What is the capacity of the blue box?

$$
4 \times 10 \times 8=320 \text { cubic units }
$$

(c) How many more cubes must be put into the box to fill it completely?

The required cubes are equal to capacity - volume $=320-224=96$ cubes

### 4.2 Measuring capacity / volume and reading capacity/volume measuring instruments

Volume and capacity can be measured with different instruments and in different units such as litres (I) and millilitres ( ml ). Millilitres are used to measure small amounts of the volume / capacity, whereas litres are used to measure larger amounts of the volume/ capacity.

Examples of measuring instruments: measuring spoons, measuring cups, measuring jugs and any other appropriate instrument for measuring volume/capacity

## Examples:

- A bottle can have a 1 litre capacity, but it may not be filled to its full capacity. It could for example, only contain a volume of 250 ml .
- Each of these jugs can hold 200 ml of liquid (or sand or salt or sugar).
- We say the capacity of each jug is 200 ml .
- There is 110 ml of juice in Jug B, and 150 ml of juice in Jug A.
- We say the volume of the juice in Jug A is $110 \mathrm{~m} \mathrm{\ell}$, and the volume of the juice in Jug $B$ is 150 ml .


1. Answer the following questions:

(a) What is the volume of juice in each of these jugs?

The volume of Jug C $=150 \mathrm{ml}$
The volume of Jug D $=150 \mathrm{ml}$
The volume of Jug E $=150 \mathrm{ml}$
(b) What is the capacity of each of these jugs?

The capacity of Jug C $=200 \mathrm{ml}$
The capacity of Jug D $=150 \mathrm{ml}$
The capacity of Jug E $=250 \mathrm{~m} \mathrm{\ell}$
2. Will you use millilitres ( $\mathrm{m} \ell$ ) or litres $(\boldsymbol{\ell})$ to measure the capacity of the following?
A


| $(\mathrm{a})$ | $\ell$ | $(\mathrm{b})$ | $\mathrm{m} \ell$ | $(\mathrm{c})$ | $\mathrm{m} \ell$ | $(\mathrm{d})$ | $\mathrm{m} \ell$ | $(\mathrm{e})$ | $\ell$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

### 4.3 Comparing and Recording capacities

1 litre is 1000 millilitres. Instead of millilitre you can write ml. Instead of litre you can write $\ell$.

In the following picture, each glass is $200 \mathrm{~m} \mathrm{\ell}$ and a bottle is $1 \ell$, meaning we will need 5 glasses to fill up a litre bottle.
We can say that:
$200 \mathrm{~m} \ell+200 \mathrm{~m} \ell+200 \mathrm{~m} \mathrm{\ell}+200 \mathrm{~m} \mathrm{\ell}+200 \mathrm{~m} \mathrm{\ell}=200 \mathrm{~m} \mathrm{\ell} \times 5=1000 \mathrm{~m} \mathrm{\ell}$
Therefore $1000 \mathrm{~m} \mathrm{\ell}=1 \ell$


An ordinary cup or glass can hold about 250 millilitres of liquid. 250 ml is the same as a quarter of a litre.


1. Consider the picture below and complete the table the follow.
(a)

(b)

(c)

(d)


| Container | Volume in m $\boldsymbol{y}$ | Volume in $\boldsymbol{l}$ | Capacity |
| :---: | :--- | :--- | :--- |
| (a) | 1750 ml | $1 \frac{3}{4} \ell$ | $2 \ell$ |
| (b) | 1250 ml | $1 \frac{1}{4} \ell$ | $2 \ell$ |
| (c) | 1800 ml | $1 \frac{4}{5} \ell$ | $2 \ell$ |
| (d) | 1200 ml | $1 \frac{1}{5} \ell$ | $2 \ell$ |

Tablespoons have a capacity of about $15 \mathrm{~m} \ell$, while a teaspoon has a capacity of 5 ml .

1. The biggest of these measuring spoons has a capacity of 25 ml . Estimate the capacity of each of the other spoons.

(a) How many 25 ml spoonful of honey will you need to fill a 250 ml container?

You will need 10 spoonful of honey.
(b) How many teaspoons of honey will you need to fill a tablespoon?

You will need 3 teaspoons of honey.

### 4.4 Solving problems relating to capacity including ratio and rate problems.

1. Four portions of 125 ml each are poured from a full 1 -litre container of milk.
(a) How much milk is left in the container?

500 ml of milk left in the container.
(b) How many more portions of 125 ml each can be poured from the container?

Four potions can be poured from the container.

### 4.5 Converting between units

When converting millilitres to litres we divide millilitres by 1000 and when we convert litres to millilitres, we multiply litres by 1000.
1 litre is $1000 \mathrm{~m} \mathrm{\ell}$. You can write $1500 \mathrm{~m} \mathrm{\ell}$ as $1 \ell+500 \mathrm{~m} \mathrm{\ell}$ or as $1 \frac{1}{2} \ell$.

| Litres and/or <br> millilitres | Fraction in litres | Fraction in <br> litres | Millilitres |
| :--- | :--- | :---: | :--- |
| 250 ml | $\frac{250}{1000}=\frac{1}{4} \ell$ | $\frac{1}{2} \ell$ | $\frac{1}{2} \times 1000=500 \mathrm{ml}$ |
| $1 \ell 500 \mathrm{ml}$ | $1+\frac{500}{1000}=1 \frac{1}{2} \ell=1,5 \ell$ | $\frac{750}{1000}=\frac{3}{4} \ell$ | $\frac{1}{8} \ell \times 1000=125 \mathrm{ml}$ |
| $750 \mathrm{~m} \mathrm{\ell}$ | $\frac{1}{5} \ell$ | $\frac{1}{5} \times 1000=200 \mathrm{~m} \mathrm{\ell}$ |  |

1. Write these volumes in descending order (from the largest to the smallest):
(a) $19 \ell+250 \mathrm{~m} \ell ; 19 \frac{1}{2} \ell ; 9250 \mathrm{~m} \ell$

19250 ml ; $19500 \mathrm{ml} ; 9250 \mathrm{ml}$
Answer: $19500 \mathrm{~m} \mathrm{\ell} ; 19250 \mathrm{~m} \mathrm{\ell} ; 9250 \mathrm{ml}$ or $19 \frac{1}{2} \ell ; 19 \ell+250 \mathrm{~m} \mathrm{\ell} ; 9$ 250 ml
(b) $650 \mathrm{~m} \mathrm{\ell} ; 6 \ell+5 \mathrm{~m} \mathrm{\ell} ; 6 \frac{1}{5} \ell$
$650 \mathrm{~m} \mathrm{\ell} ; 6000 \mathrm{ml}+5 \mathrm{~m} \mathrm{\ell} ; 6200 \mathrm{ml}$
660 ml ; $6005 \mathrm{ml} ; 6200 \mathrm{ml}$
Answer: $6200 \mathrm{~m} \mathrm{\ell} ; 6005 \mathrm{~m} \mathrm{\ell} ; 660 \mathrm{~m} \mathrm{\ell}$ or $6 \frac{1}{5} \ell ; 6 \ell+5 \mathrm{~m} \mathrm{\ell} ; 660 \mathrm{~m} \mathrm{\ell}$
(c) $8750 \mathrm{~m} \mathrm{\ell} ; 87 \ell+50 \mathrm{~m} \mathrm{\ell} ; 8 \frac{1}{4} \ell ; 8 \frac{1}{2} \ell$
$8750 \mathrm{ml} ; 87000 \mathrm{ml}+50 \mathrm{ml} ; 8250 \mathrm{ml} ; 8500 \mathrm{ml}$
87050 ml ; 8750 ml ; 8500 ml ; 8250 ml or
$87 \ell+50 \mathrm{ml} ; 8750 \mathrm{ml} ; 8,5 \ell ; 8 \frac{1}{4} \ell$
2. Express each of the following in millilitres.
(a) $2 \ell+250 \mathrm{ml}=2250 \mathrm{ml}$
(b) $3 \ell+500 \mathrm{ml}=3500 \mathrm{ml}$
(c) $4 \frac{1}{2} \ell \quad=4500 \mathrm{ml}$
(d) $4 \frac{3}{4} \ell \quad=4750 \mathrm{ml}$
(f) $5 \ell+\frac{1}{4} \ell \quad=5250 \mathrm{~m} \mathrm{\ell}$
(g) $6 \ell \quad=6000 \mathrm{ml}$
(h) $7 \frac{1}{2} \ell \quad=7500 \mathrm{ml}$

## UNIT 5

## MASS

### 5.1 What is mass?

Mass refer to the weight of an object. It depends on the amount of matter in an object e.g. a horse's mass is more than a dog's mass. If we want to measure how heavy something is, we need a unit.
Mass is measured in grams (g) and kilograms (kg).
Kilogram is heavier than a gram.
Kilo- means thousand: 1 kilogram = 1000 grams

$$
\begin{aligned}
& 1000 \mathrm{~g}=1 \text { kilogram } \\
& 2000 \mathrm{~g}=2 \text { kilogram }
\end{aligned}
$$

## 1. Heavy and light


(a) Which bag is heavier, the one in the right or left hand? The bag on the left hand is heavier.
(b) Which is easier to carry, 4 tins full of bake beans, or 5 empty tins? It is easier to carry 5 empty tins.
2. Will the following products be weighed in grams or kilograms? Write a) to f) in your book. Indicate with a "yes" where appropriate.

| Object | Grams | Kilograms |
| :--- | :--- | :--- |
| (a) A matchstick | Yes |  |
| (b) Loaf of bread | Yes |  |
| (c) Soccer Ball | Yes |  |
| (d) 6 books | Yes | Yes |


| (e) 4 year old boy |  | Yes |
| :--- | :--- | :--- |
| (f) Car |  | Yes |

## Balancing scale:

## Example

We often decide which of two objects is heavier just by estimating how difficult it is to lift the objects. We can also compare mass by using a balance. You can make your own balance using a clothes hanger and two shopping bags.

3. Make your own balancing scale: Weigh the following objects to compare their weight in terms of which one weighs more or less
(a) eraser or your pencil
(b) 3 rulers or a sock
(c) 3 rulers or 20 bottle tops

This is a practical activity. Any suitable answer is acceptable.
4. Answer the following questions.
a)

b)

c)

d)

e)

f)

g)

(a) Arrange the following products from the heaviest to the lightest;

C; A; F; E; D;G; B
(b) Which items weigh the same?
$A$ and $F$;
(c) How many kilograms will there be, if you add all the kilograms together.
$1 \mathrm{~kg}+100 \mathrm{~g}+2 \mathrm{~kg}+250 \mathrm{~g}+500 \mathrm{~g}+1 \mathrm{~kg}+200 \mathrm{~g}$
$=1 \mathrm{~kg}+0,1 \mathrm{~kg}+2 \mathrm{~kg}+0,250 \mathrm{~kg}+0,5 \mathrm{~g}+1 \mathrm{~kg}+0,2 \mathrm{~g}$ $=5,05 \mathrm{~kg}$
(d) Add all the grams together.

$$
\begin{aligned}
& 1 \mathrm{~kg}+100 \mathrm{~g}+2 \mathrm{~kg}+250 \mathrm{~g}+500 \mathrm{~g}+1 \mathrm{~kg}+200 \mathrm{~g} \\
& =1000 \mathrm{~g}+100 \mathrm{~g}+2000 \mathrm{~g}+250 \mathrm{~g}+500 \mathrm{~g}+1000 \mathrm{~g}+200 \mathrm{~g} \\
& =5050 \mathrm{~g}
\end{aligned}
$$

(e) Is it more than a kilogram? The answer is more than a kilogram

### 5.2 Reading instruments and measuring mass.

If we want to measure how heavy something is, we need a unit. The unit you used in question 1,2 and 3 was objects with different weights. If you used different sized objects than your classmates, you cannot compare your measurements because your units were different.

We use kilogram (kg) and gram (g) to measure weight.

1. This is an unnumbered line on a scale.

Draw the line in your book and write down the digits that is missing.

2. Different types of scales: Numbered and unnumbered scales

(a) What will you weigh on these scales? Write the name of the object.
A. Food or any suitable answer.
B. Body mass or any suitable answer.
C. Vegetables or any suitable answer.
(b) Which scale is not numbered?
[DBE WB pg 117] Scale C is not numbered.
3. What would you weigh with the following measuring instruments? Would you weigh it in kilograms or grams?

(a) Kitchen scale
(b) Bathroom scale
(c) Spring scale
(d) Balance scale

Tomatoes in grams or any suitable answer.
Body mass in kilograms or any suitable answer.
Small quantity of vegetables or any suitable answer. Peanuts or any suitable answer.

When mass measurements need to be accurate, we have to agree to compare the mass of all objects to the standard unit. The standard unit for mass measurement is one kilogram ( kg ) and for smaller objects gram ( g )
4. These scales are marked in intervals of 10 kg . Draw them in your book and write the numbers in. Fill in the appropriate numbering.

| A | B |
| :---: | :---: |
|  |  |
| $\left(\begin{array}{cc} g_{g} 0^{T} & 1 \mathrm{~g} \\ -8 \mathrm{~g} & \\ -7 \mathrm{~g} & \\ 6 \mathrm{~g} & \\ 6 g^{4 g} \end{array}\right)$ |  |

5. Write the weight of each object on the scale down. The maximum reading on the scale is 10 kg

6. Copy the number lines in your books and fill in the grams and kilograms on the number lines.
(



### 5.3 Calculations including conversions and problem-solving

## Kilogram and gram

Many objects weight is less than a kilogram. These lighter objects must be measured in gram.
$1 \mathrm{~kg}=1000 \mathrm{~g}$
Cake flour: $2.5 \mathrm{~kg}=2 \frac{1}{2} \mathrm{~kg} \quad=2 \mathrm{~kg}$ and $500 \mathrm{~g} \quad=2500 \mathrm{~g}$

1. Convert the mass from kilogram to gram.
(a) $\frac{1}{2} \mathrm{~kg}=500 \mathrm{~g}$
(c) $5,5 \mathrm{~kg}=5500 \mathrm{~g}$
(b) $\frac{1}{4} \mathrm{~kg}=250 \mathrm{~g}$
(d) $1 \mathrm{~kg}=1000 \mathrm{~g}$
2. Write the mass of the following in kilogram or fractions.
(a) $2500 \mathrm{~g}=2 \frac{1}{2} \mathrm{~kg}$
(d) $6000 \mathrm{~g}=6 \mathrm{~kg}$
(b) $500 \mathrm{~g}=\frac{1}{2} \mathrm{~kg}$
(e) $250 \mathrm{~g}=\frac{1}{4} \mathrm{~kg}$
(c) $3250 \mathrm{~g}=3 \frac{1}{4} \mathrm{~kg}$
3. Write these masses in gram only.
(a) $3 \mathrm{~kg}=3000 \mathrm{~g}$
(f) $\frac{2}{5} \mathrm{~kg}=400 \mathrm{~g}$
(b) $7 \frac{1}{4} \mathrm{~kg}=7250 \mathrm{~g}$
(g) $10 \mathrm{~kg}=10000 \mathrm{~g}$
(c) 2 kg and $500 \mathrm{~g}=2500 \mathrm{~g}$
(h) $\frac{1}{4} \mathrm{~kg}=250 \mathrm{~g}$
(d) $\frac{1}{2} \mathrm{~kg}=500 \mathrm{~g}$
(i) 12 kg and $467 \mathrm{~g}=12467 \mathrm{~g}$
(e) $1465 \mathrm{~kg}=1465000 \mathrm{~g}$
(j) 4 kg and $20 \mathrm{~g}=4020 \mathrm{~g}$
4. Round off to the nearest 1000 :
(a) $4321 \mathrm{~g} \sim 4000 \mathrm{~g}$
(d) $5997 \mathrm{~kg} \sim 6000 \mathrm{~kg}$
(b) $1599 \mathrm{~g} \sim 2000 \mathrm{~g}$
(e) $999 \mathrm{~kg} \sim 1000 \mathrm{~kg}$
(c) $2834 \mathrm{~g} \sim 3000 \mathrm{~g}$
(f) $1947 \mathrm{~kg} \sim 2000 \mathrm{~kg}$

### 5.4 Calculate and estimate using grams and kilograms



1. Complete and answer the following:
(a) $500 \mathrm{~g}+500 \mathrm{~g}+1250 \mathrm{~g}+250 \mathrm{~g}=2500 \mathrm{~g}$
(b) How much more do you need to get 3 kg ? 500 g more is needed.
(c) How many grams must be added to 999 g to have 1 kg ? One (1) g must be added.
(d) John weighs 65 kg and his father 96 kg . John, his father and baby brother weigh 171 kg altogether. How much does the baby brother weigh?
The baby brother weighs $171 \mathrm{~kg}-(65 \mathrm{~kg}+96 \mathrm{~kg})=171 \mathrm{~kg}-171 \mathrm{~kg}=$ 10 kg
2. Calculate the following:
(a) $54 \mathrm{~kg}+350 \mathrm{~g}+6 \mathrm{~kg} \quad=60 \mathrm{~kg} 350 \mathrm{~g}$
(b) $4670 \mathrm{~g}+3254 \mathrm{~g}$
$=7 \mathrm{~kg} 924 \mathrm{~g}$
(c) $2450 \mathrm{~kg}+1750 \mathrm{~kg}$
$=4200 \mathrm{~kg}$
(d) $1200 \mathrm{~kg}+500 \mathrm{~g}$
$=1200 \mathrm{~kg} 500 \mathrm{~g}$
3. Write the correct answer in the open spaces.
a) $500 \mathrm{~g}+250 \mathrm{~g}+250 \mathrm{~g}=1000 \mathrm{~g}$ or 1 kg
b) $500 \mathrm{~g}+500 \mathrm{~g}=1 \mathrm{~kg}=250 \mathrm{~g}+250 \mathrm{~g}+250 \mathrm{~g}+250 \mathrm{~g}$
c) $200 \mathrm{~g}+200 \mathrm{~g}+200 \mathrm{~g}+200 \mathrm{~g}+200 \mathrm{~g}=1 \mathrm{~kg}$

### 5.5 Solving problems relating to mass

1. Mom buys a 3 kg washing powder. She uses 250 g every time she does washing. How many times will she do the washing, if the amount of the washing is the same?

250 g is a quarter of 1 kg meaning there are $4 \times 250 \mathrm{~g}$ in a kilogram.
There are $3 \times 4 \times 250 \mathrm{~g}$ in 3 kilograms
There are 12 grams in 3 kilograms.
Mom will use the washing powder 12 times.
2. A pole weighs 320 kg . How much will 3 poles of the same kind weigh?

Three poles will weight $3 \times 320 \mathrm{~kg}=960 \mathrm{~kg}$
3. How many 200 g of powdered soap will you need to fill up 2 kg packet of the same soap?
Ten 200 g of powdered soap
4. The mass of a bar of soap is 325 g . We use 4 bars of soap per week. How many grams will that be?

We will use $4 \times 325 \mathrm{~g}$ per week $=1300 \mathrm{~g}$
5. How many 250 g of soap will you add to 250 g of the same soap to make 1 kg .

$$
\begin{aligned}
■ \times 250 \mathrm{~g}+250 \mathrm{~g} & =1000 \mathrm{~g} \\
\square 250 \mathrm{~g}+250 \mathrm{~g}-250 \mathrm{~g} & =1000 \mathrm{~g}-250 \mathrm{~g} \\
■ \times 250 \mathrm{~g} & =750 \mathrm{~g} \\
\frac{\square \times 250 \mathrm{~g}}{250 \mathrm{~g}} & =\frac{750 \mathrm{~g}}{250 \mathrm{~g}} \\
■ & =3
\end{aligned}
$$

Three 250 grams of soap will be added to 250 grams to make one kilogram.
（a）The mass of one egg is 60 grams．How much will 6,12 and 24 eggs of the same eggs weigh respectively？

1 egg weighs 60 g ；
6 eggs weigh $6 \times 60 \mathrm{~g}=360 \mathrm{~g}$ ；
12 eggs weigh $12 \times 60 \mathrm{~g}=720 \mathrm{~g}$
24 eggs weigh $24 \times 60 \mathrm{~g}=1440 \mathrm{~g}$

## UNIT 6

## DATA HANDLING

## 6．1 Collect data，organise and summarise data

Data collection is the systematic approach to gathering and measuring information from a variety of sources to get a complete and accurate picture of an area of interest．A group of people chosen to gather specific information from is called the population e．g．all the learners in a school
－A frequency table is a method of organising data in a compact form．
－A tally is mark used to record data as it is counted．Tally marks are a quick way of keeping track of numbers in groups of five．We use vertical and diagonal lines to represent a tally mark．One vertical line is made for each of the first four numbers；the fifth number is represented by diagonal line across the previous four．e．g．代 represents 5，／WN／／represents 7，
－Frequency is the total number of times each category of data occurs．

## Example

The table below shows data collected from learners on the different kind of drinks they like．

The results were used to draw the frequency table．
FREQUENCY TABLE

| Drinks | Tally | Frequency |
| :---: | :---: | :---: |
| Fizzy drink | WH11 | 6 |
| Ice lolly | W以 | 5 |
| Juice | INH II | 7 |
| Milk | 钥现 | 10 |
| Water | 巩 N以I | 11 |
| TOTAL |  | 38 |

1. The teacher conducts a survey in the class to find out what each learners favourite kind of chocolate is.

The table depends on learner preferences.

| TYPE OF CHOCOLATE | TALLY MARKS | FREQUENCY |
| :---: | :---: | :---: |
| Mint Crisps | WHI XIL |  |
| Biscuits |  | 5 |
| Whole nuts |  | 16 |
| Dark Chocolate | IIII |  |
| Peanuts and Raisins | IW II | - |
| Milk Chocolate |  | 8 |
| TOTAL |  |  |

### 6.2 Representing data

## Graphs

Graphs give a visual picture of data. There are different types of graphs e.g. bar graphs, pictographs and pie charts. Different graphs provide different pictures of data e.g. in pictographs, pictures are used to illustrate data. In bar graphs, vertical or horizontal columns of equal width are used to illustrate data and in pie charts, sectors represent a fraction of the whole.

## Bar graph

Bar graphs are ideal for comparing two or more values.
When drawing bar graphs you should write the title or heading and label the vertical axes and the horizontal axes. The heading or title of the bar graph provide an overview of the information it contains and give the readers an indication of the data they will be looking at.

## Example



Represent the data collected from the learners' favourite types of chocolates on a bar graph. Remember to label your graph correctly.

The bar graph depends on the information gathered in class.

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## Pictographs

Pictographs are graphs that show numerical information by using picture symbols or icons to represent data sets. The advantage of using pictographs is that they are easy to read. They must have a key to show what each symbol or picture means. Each picture must be of identical size. They can display
pictures in rows or columns. In a pictograph, the symbols must always be the same size, but you can show a part of them to represent a different amount.

## Example

This picture shows the bags of waste collected in a school in 5 weeks
WASTE COLLECTED EACH WEEK

| $\begin{aligned} & \text { An } \\ & \text { Nin } \\ & \text { Nin } \end{aligned}$ |  |  | $\begin{aligned} & \text { An } \\ & \text { (n) } \\ & \frac{n}{m} \end{aligned}$ |  |
| :---: | :---: | :---: | :---: | :---: |
| Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |

Key: represents 5 bags

Thus, 20 bags were collected in week 5.

1. Use the pictograph to answer the questions
(a) Which week had the most number of bags collected? Week 5
(b) How many bags were collected in week 2? 15 bags
(c) How many bags were collected in total? 75 bags
(d) Which week had the least number of bags collected? Week 3
(e) What could be the reason for week 5 to have more waste than all the other weeks? Possible it was a month end, or an event. ( Any sound reason)
(f) Write a short paragraph about what is happening in this graph. The pictograph shows the amount of litter collected in each week.

### 6.3 Interpreting and reporting data

Pie Chart
A pie chart gives a visual image of data in the form of a circle. The whole circle represents the total number of people or objects involved in data collection. In a pie chart, the parts (slices) are fractions of the pie or circle. The differentsized parts of the pie chart stand for the quantities. A pie chart has a heading and a key to give the meaning its meaning.

## Example

40 Grade 5 learners were given the names of six kinds of fruit from which to choose their favourite. The information was illustrated on a pie chart.

Learner's favourite fruit


Thus, $\frac{1}{2}$ of the learners chose banana (Half of the learners chose banana)

1. A school held a sports day and the playgrounds were full of litter. The graph was drawn to represent the bins of litter collected.
(a) Write a heading of the pie chart on the space provided.

## LITTER COLLECTED DURING A SPORTS DAY


(b) How many waste bins of glass did they collect? 6 glass waste bins collected
(c) How many waste bins of paper did they collect? 8 paper waste bins collected
(d) How many waste bins of plastic did they collect? 10 plastic waste plastic bins
(e) How many waste bins of metal did they collect? 4 metal waste bins collected
(f) Why do you think the school collected so much plastic? Any suitable answer.
(g) What will you do with all this waste? Recycle or any suitable answer
(h) What type of waste did they not collect? What will you do with this type of waste? Any suitable answer.

