GRADE 12

MATHEMATICAL LITERACY

MODULE 1

eCUBE ONLINE

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About eCUBE ONLINE

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- Learning fee includes examination fee.

Availability of free mentor service

- Three (3) hours per subject mentorship for free.
- Students can communicate with their mentor via zoom, email, or WhatsApp or telephone.
- Students may also comment/pose questions on the Special Request section on the learning site that is screened and answered by subject experts. This Special Request section will be accessible to all students, so could provide answers for students who might have had the same enquiry.

User-friendly learning format

- Each matric subject is divided into 12 modules to ensure paced and easy learning.
- You have access to learning material, 24 hours per day and 7 days a week.
- Monitor your progress at the end of each module.
- Each module has exercises based on the topics covered in the module and previous module.
- The questions are based on the type of assessment candidates may expect in the National examination to practice the application of knowledge gained.
- At the end of each module, a compulsory quiz ensures that the candidate has gained the general knowledge required for the topic covered before progress is made to the following module.
- The modules were compiled from multiple resources, both prescribed by the Department of Education and other professionals, to ensure that the topics are covered in detail and from all perspectives.
- Subject specialists with years of experience in teaching their subjects, proof-read all modules and assisted with recommendations to ensure full coverage and easy learning.
- Modules are updated as the curriculum changes to ensure the validity of the learning material.

CONTENTS

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UNIT 1: INTRODUCTION AND BASIC KNOWLEDGE

LEARNING OBJECTIVES

At the end of this unit, you should be able to:

- Master the basic mathematical skills and calculations needed to be successful in Mathematical Literacy.
- Understand and have knowledge of the technical terminology required in Mathematical Literacy.

You should spend more or less 8 hours on this unit.

1. FORMAT OF QUESTION PAPERS 1

Two question papers will be written, each with a 150-mark total in a three-hour session.

PAPER 1:	PAPER 2:
Basic Skills – You will be assessed on your proficiency in the contents and skills.	Assessment of your ability to apply your knowledge by using mathematical and non-mathematical techniques.
• Five questions. • Four questions dealing with finance, measurements, maps and representations and data handling. • Fifth question integrates all the above-mentioned data. •	• Four of five questions. • Each question deals with all the topics covered in the syllabus.
Content will be limited to the topics covered in the syllabus.	Familiar and unfamiliar topics will be tested and studied in the syllabus.

2. BASIC MATHEMATIC CALCULATIONS

1. Write $\frac{49}{140}$ as a decimal. **Solution:** $\frac{49}{140} = 0,35$	To write a fraction as a decimal means converting that fraction to a decimal or giving a decimal that is equivalent to the fraction. You would require a calculator to do that.
2. Simplify 65 : 208. **Solution:** 65 : 208 = 13 x 5 : 13 x 16 $= \frac{13 \times 5}{13} : \frac{13 \times 16}{13}$ = 5 : 16	This means: Write the ratio in its simplest form. The first thing here is to find a common factor between 65 and 208 (other than 1), i.e. a number that divides both 65 and 208. **That number is 13.**
3. Convert 2,35 ℓ to mℓ. **Solution:** 2,35 ℓ = 2,35 × 1 000 mℓ = 2 350 mℓ	Here we are converting from litres to millilitres. You should know that a litre is bigger than a millilitre or conversely a millilitre is smaller than a litre. So, there are *a number* of millilitres in a litre. Find that number! That number is 1000. Hence: **1 ℓ = 1000 mℓ**. (ALWAYS do this analysis as it will tell you if you need to divide or multiply in the conversion.) That is, there are: • 1x1000 millilitres in 1 litre. • 2x1000 millilitres in 2 litres; and therefore • 2,35x100 millilitres in 2,35 litres.
4. Convert R1 360,00 into dollars, where $1 = R8,50. **Solution:** R1 360,00 = $ $\frac{1\ 360}{8,50}$ = $160	Here you are required to convert R to $ and yet you are given $ to R. (That is, $1 = R8,50) If R8,50 = $1, Then R$\frac{8,50}{8,50} = \frac{\$1}{8,50}$ That is R1 = $1

	8,50 Therefore, to convert any amount (say x) in R to $ you simply need to divide that number by 8,50 and write the answer in dollars ($). For example: If $1 = R8,50 then R425,00 = $ 50.
5. Calculate: $\frac{3}{4} \times (4)^3 - \sqrt{25}$	It is always advisable that you first simplify the expression before using a calculator. Work out each term of the expression such that it is in its simplest form. Take note that there are **two** terms in this expression (one subtracted from the other), viz.: $\frac{3}{4} \times (4)^3$ and $\sqrt{25}$. Then apply your BODMAS rule: In this case first workout $(4)^3$ in the first term before multiplying the answer by $\frac{3}{4}$. Then the first term in its simplest form becomes 48, where the second term in its simplest form becomes 5. You may now subtract 5 from 48.
Solution: $\frac{3}{4} \times (4)^3 - \sqrt{25} = \frac{3}{4} \times 64 - 5$ $= 48 - 5$ $= 43$	
6. Decrease R1 360,00 by 14%.	This is the same as saying calculate: R1 360,00 - (14% of R1 360,00). We therefore need to find out what is 14% of R1 360,00 before we can do the decrease (subtract).
Solution: 14% × R 1 360,00 = $\frac{14}{100} \times$ R1 360,00 = R190,40 New amount = R1 360,00 – R190,40 = R1 169,60	
7. Determine the number of 2,5 m lengths of material that can be cut from a roll of material that is 40 m long.	That is, the number of lengths you would find when you cut material that is 40 m long into equal lengths of 2,5 m.
Solution:	

Number of lengths = $\frac{40\,m}{2{,}5\,m}$ = 16 lengths	
8. Convert 220 $_{o}$C to $_{o}$F using the following formula: **Temperature in $_{o}$F = (Temperature in $_{o}$C $\times \frac{9}{5}$) + 32$_{o}$**	Each time a formula is provided all that is required is the correct SUBSTITUTION and the calculations. Here we are to convert $_{o}$C to $_{o}$F and the given formula is already in $_{o}$F.
Solution: Temperature in $_{o}$F = (Temperature in $_{o}$C $\times \frac{9}{5}$) + 32$_{o}$ = (220$_{o}$ $\times \frac{9}{5}$) + 32$_{o}$ = 396$_{o}$F + 32$_{o}$F = 428$_{o}$F	

3. TECHNICAL TERMINOLOGY – GLOSSARY

Account	Finance: A record of income and expenditure. To explain, e.g. “Account for why the sky is blue.
Algebra	A mathematical system where unknown quantities are represented by letters, which can be used to perform complex calculations through certain rules.
Angle	The difference in position between two straight lines which meet at a point, measured in degrees.
Annual	Once every year. (E.g. “Christmas is an annual holiday”)
Annum, per	For the entire year. (E.g. “You should pay R 100 per annum”)
Area	Length x breadth (width). In common usage: a place.
Asset	Something having value, which can be sold to defray (get rid of) debts. Can refer to physical things such as houses, cars, etc., or to savings and investments.
ATM	Abbreviation: Automatic Teller Machine

Average	Mathematics: The sum of parts divided by the quantity of parts. In common use: neither very good, strong, etc., but also neither very weak, bad, etc; the middle. If you are asked to find the average, you always have to calculate it using the information you have. For example, the average of (1;2;3) is 2, because (1+2+3)/3 = 2. See also mean, median and mode.
Axis	A line along which points can be plotted (placed), showing how far they are from a central point, called the origin. "Vertical axis" or "y-axis" refers to how high up a point is above the origin (or how far below). "Horizontal axis" or "x-axis" refers to how far left or right a point is away from the origin.
Bias	To be inclined against something or usually unfairly opposed to something; to not accurately report on something; to favour something excessively.
BMI	Body mass index. Calculated by dividing someone's weight in kilograms by the square of his or her height in metres. An indication of whether someone is over- or underweight.
BODMAS	Brackets, of/orders (powers, squares, etc.), division, multiplication, addition, subtraction. A mnemonic (reminder) of the correct order in which to do mathematical operations.
borrow vs lend	To take something (e.g. money) from someone with their permission for temporary use (borrow). Lend means the opposite: it means to give money to someone for temporary use. Remember: Borrow from, lend to. Can refer to financial transactions. If you take money from a bank, you are the borrower and the bank is the lender.
Breadth	How wide something is. From the word "broad".
Budget	To plan how to spend money; a plan of how to spend money; an estimate of the amount of money available.
Cartesian	Anything believed or proposed by Rene Descartes. In particular, the x-and-y axis coordinate system.
Cash	Printed or minted money, money not represented by cheques, cards, etc.
Cashier	Person who receives payment.
Chart	To draw a diagram comparing values on Cartesian axes.
Cheque	A bill issued by banks, and filled in by the drawer (the person writing it), to represent an amount owed, usually with place to state who the amount is due to.
Circumference	The distance around the outer rim of a circle.
Compound Interest	Interest charged on an amount due but including interest charges to date. Compare to simple interest.
Continuous	Mathematics: having no breaks between mathematical points; an unbroken graph or curve represents a continuous function.
Control variable	A variable that is held constant to discover the relationship between two other variables.
Coordinate	The x or y location of a point on a Cartesian graph, given as an x or y value. Coordinates are given as an ordered pair (x, y).
Credit	To lend someone money; to have a certain amount of money that is not one's own that was lent to one. Credit limit: how much money you have borrowed or may borrow against.
Cubed	The power of three; multiplied by itself three times.
Cubic	Shaped like a cube; having been multiplied by itself three times.

Cylinder	A tall shape with parallel sides and a circular cross-section – think of a log of wood, for example, or a tube. See parallel. The formula for the volume of a cylinder is πr2h.
Debit	When someone or an organization takes money out of your account. Compare to withdraw.
Debt	The state of owing money.
Deficit	Excess spending, or the difference between the amount owed and the amount paid; shortfall; the excess of expenditure (spending) or liabilities (debts) over income (earnings) or assets.
Denominator	See divisor. In popular speech: a common factor.
Dependent (variable)	A variable whose value depends on another; the thing that comes out of an experiment, the effect; the results. See also independent variable and control variable. The dependent variable has values that depend on the independent variable, and we plot it on the vertical axis.
Deposit	Finance: to place money into an account.
Derivation	Mathematics: to show the working of your arithmetic or answer or solution; the process of finding a derivative.
Derivative	Mathematics: The rate of change of a function with respect to an independent variable. See independent variable. In common use: something that comes from something else.
Diagonal	A line joining two opposite corners of an angular shape.
Diameter	The line passing through the centre of a shape from one side of the shape to the other, esp. a circle. Formula: d = 2r. See radius, radii, and circumference.
Difference	Mathematics: subtraction. Informally: a dissimilarity. How things are not the same.
Dimension	A measurable extent, e.g. length, breadth, height, depth, time. Physics, technical: the base units that make up a quantity, e.g. mass (kg), distance (m), time (s).
Distribution	How something is spread out. Mathematics: the range and variety of numbers as shown on a graph.
Divisor	The number below the line in a fraction; the number that is dividing the other number above the fraction line. See numerator, denominator.
Domain	The possible range of x-values for a graph of a function. See range.
Element	Mathematics: part of a set of numbers. Popular use: part of.
Expenditure	How much money, time, or effort has been used on something?
Expense	How much something costs in time, money, or effort.
Expensive	Using too much time, money or effort.
Exponent	When a number is raised to a power, i.e. multiplied by itself as many times as shown in the power (the small number up above the base number). So, 23 means 2 x 2 x 2. See also cubed.
Exponential	To multiply something many times; a curve representing an exponent.
Extrapolation	To extend the line of a graph further, into values not empirically documented, to project a future event or result. In plain language: to say what is going to happen based on past results which were obtained (gotten) by experiment and measurement. If you have a graph and have documented certain results (e.g. change vs time), and you draw the line further in the same curve, to say what future results you will get, that is called 'extrapolation'. See predict.

Fraction	Mathematics: Not a whole number; a representation of a division. A part. E.g. the third fraction of two is 0,666 or _ 23_ . Meaning two divided into three parts.
Frequency	How often.
Function	Mathematics: when two attributes or quantities correlate. If y changes as x changes, then y = f(x). See correlate, graph, Cartesian, axis, coordinate. Also: a relation with more than one variable (mathematics).
Fund	A source of money; to give money.
Gradient	A slope. An increase or decrease in a property or measurement. Also, the rate of such a change. In the formula for a line graph, y = mx + c, m is the gradient.
Graph	A diagram representing experimental or mathematical values or results. See Cartesian.
Graphic	A diagram or graph. Popular use: vivid or clear or remarkable.
Graphically	Using a diagram or graph.
Histogram	A bar graph that represents continuous (unbroken) data (i.e. data with no gaps). There are no spaces between the bars. A histogram shows the frequency, or the number of times, something happens within a specific interval or "group" or "batch" of information.
Hyperbola	Mathematics: a graph of a section of a cone with ends going off the graph; a symmetrical (both sides the same) open curve.
Hypotenuse	The longest side of a right-angled triangle.
Incline	Slope. See gradient; to lean.
Independent (variable):	The things that act as input to the experiment, the potential causes. Also called the controlled variable. The independent variable is not changed by other factors, and we plot it on the horizontal axis. See control, dependent variable.
Inflation	That prices increase over time; that the value of money decreases over time
Informal sector:	Not part of the formal economy; street vendors or home workers; self-employed persons who have not formally registered a corporation or company but are manufacturing or selling items or work.
Insurance	Finance: an agreement with an insurance company in which money is paid to guarantee against or compensate for future mishaps or losses. See premium. General use: something that is set up to prevent against future loss or mishap.
Interest	Finance: money paid regularly at a particular rate for the use or loan of money. It can be paid by a finance organization or bank to you (in the case of savings), or it may be payable by you to a finance organization on money you borrowed from the organisation. See compound interest and simple interest, see also borrow.
Intermediate	A state in between.
Interquartile	Between quartiles. See quartile.
Interval	Gap. A difference between two measurements.
Inverse	The opposite of. Mathematics: one divided by. E.g. 12_is the inverse of 2
Invest	To put money into an organization or bank (e.g. in buying shares) to gain interest on the amount at a higher rate. See interest.
Investment	Something in which you have invested money (time, or effort, in common usage).
Investor	A person who has invested (usually money).

Invoice	A formal request for payment (in writing). It will usually state the name of the supplier or vendor (shop); the address of the shop or company that is requesting the amount; the VAT number of the shop; the words “Tax Invoice”; the shop’s invoice number; the date and time of the sale; a description of the items or services bought; the amount of VAT charged (14%); the total amount payable.
kWh	Unit of power (kilowatt hours) that electricity suppliers charge for. See power, watt. 1000 watts used in 1 hour = 1kWh = 1 unit. So e.g. a 2000 W heater uses 2 units per hour.
Liability	To owe, or to have something that causes one to be in debt; something that causes you to have to spend money; a legal or financial responsibility.
Linear	In a line. Mathematics: in a direct relationship, which, when graphed with Cartesian coordinates, turns out to be a straight line.
Logarithm	Mathematics: a quantity representing the power by which a fixed number (the base) must be raised to produce a given number. The base of a common logarithm is 10, and that of a natural logarithm is the number e (2,7183…). A log graph can turn a geometric or exponential relationship, which is normally curved, into a straight line.
Longitude	Lines running north to south on the earth, measuring how far east or west one is, in degrees, from Greenwich in the UK. “Longitudinal” means from north to south, or top to bottom. Running lengthwise: Physics: a wave whose vibrations move in the direction of propagation (travel). Example: sound. Statistics: a study in which information is gathered about the same people or phenomena over a long period of time. Magnitude: Size. Manipulate: To change or rearrange something. Usually in Mathematics it means to rearrange a formula to solve for (to get) an answer.
Mean	See average.
Mechanical	By means of physical force.
Median	Mathematics: the number in the middle of a range of numbers written out in a line or sequence.
Member	A part of. Finance: a person or legal entity who is partial owner of a company.
Meter	A device to measure something. You might see this spelling used in American books for meter. See meter.
Metre	The SI unit of length, 100 cm.
Metric	A measurement system, using a base of 10 (i.e. all the units are divisible by 10). The USA uses something known as the Imperial system, which is not used in science. The Imperial system is based on 12. Examples: 2,54 cm (metric) = 1 inch (imperial). 1 foot = 12 inches = approx. 30 cm; 1 meter = 100 cm. 1 Fl.Oz (fluid ounce) = approx. 30 mℓ
Minimize	To make as small as possible.
Minimum	The smallest amount possible.
Modal	Pertaining to the mode, or method. Can mean: about the mathematical mode or about the method used. See mode.
Mode	Mathematics: the most common number in a series of numbers. See also mean, median.
Model	A general or simplified way to describe an ideal situation, in science, a mathematical description that covers all cases of the type of thing being observed. A representation.

Numerator	The opposite of a denominator; the number on top in a fraction.
Optimal	Best, most
Origin	Mathematics: the centre of a Cartesian coordinate system. General use: the source of anything, where it comes from.
Outlier	Statistics: a data point which lies well outside the range of related or nearby data points.
Parallel	Keeping an equal distance along a length to another item (line, object, figure). Mathematics: two lines running alongside each other which always keep an equal distance between them.
PAYE	Pay as you earn, tax taken off your earnings by your employer and sent to the South African Revenue Service before you are paid.
Percent	For every part in 100. The rate per hundred.
Percentile	A division of percentages into subsections, e.g. if the scale is divided into four, the fourth percentile is anything between 75 and 100%.
Perimeter	The length of the outer edge; the outer edge of a shape.
Period	The time gap between events; a section of time.
Periodic	Regular; happening regularly.
Perpendicular	At right angles to (90˚).
Pi	π, the Greek letter p, the ratio of the circumference of a circle to its diameter. A constant without units, value approximately 3,14159.
Plan	Architecture: a diagram representing the layout and structure of a building, specifically as viewed from above. More general use: any design or diagram, or any intended sequence of actions, intended to achieve a goal.
Plot	To place points on a Cartesian coordinate system; to draw a graph.
Policy	Finance: a term referring to an account held with an insurance company; an agreement that the company insures you. General use: a prescribed course of action.
Predict	General use: to foresee. Mathematics: see extrapolation.
Premium	An amount paid by you to an insurance company for your policy. See policy. General use: expensive or valuable.
Probability	How likely something is. See likely. Probability is generally a mathematical measure given as a decimal, e.g. [0] means unlikely, but [1,0] means certain, and [0,5] means just as likely versus unlikely. [0,3] is unlikely, and [0,7] is quite likely. The most common way to express probability is as a frequency, or how often something comes up. E.g. an Ace is 1/13 or 0,077 likely, in a deck of cards, because there are 4 of them in a set of 52 cards.
Product	Mathematics: the result of multiplying two numbers.
Project	A project is a plan of action or long-term activity intended to produce something or reach a goal. To project is to throw something, or to guess or predict (a projection). To project a result means to predict a result. See extrapolate.
Proportion	To relate to something else in a regular way, to be a part of something in relation to its volume, size, etc.; to change as something else changes. See correlate and respectively.
Pythagoras's Theorem	The square on the hypotenuse is equal to the sum of the squares on the other two sides of a right-angled triangle. Where h is the hypotenuse, a is the side adjacent to the right angle, and b is the other side: $h_2 = a_2 + b_2$.

Qualitative	Relating to the quality or properties of something. A qualitative analysis looks at changes in properties like colour, that can't be put into numbers. Often contrasted with quantitative.
Quantitative	Relating to, or by comparison to, quantities. Often contrasted with qualitative. A quantitative analysis is one in which you compare numbers, values and measurements.
Quantity	Amount; how much.
Quartile	A quarter of a body of data represented as a percentage. This is the division of data into 4 equal parts of 25% each. To determine the quartiles, first divide the information into two equal parts to determine the median (Q2), then divide the first half into two equal parts, the median of the first half is the lower quartile (Q1), then divide the second half into two equal parts, and the median of the second half is the upper quartile (Q3). Data can be summarized using five values, called the five-number summary, i.e. the minimum value, lower quartile, median, upper quartile, and maximum value.
Radius	The distance between the centre of an object, usually a circle, and its circumference or outer edge. Plural is pronounced "ray-dee-eye.
Random	Unpredictable, having no cause or no known cause. Done without planning.
Range	Mathematics: the set of values that can be supplied to a function. The set of possible y-values in a graph. See domain.
Rate	How often per second (or per any other time period). Finance: the exchange rate or value of one currency when exchanged for another currency; how many units of one currency it takes to buy a unit of another currency. Also "interest rate", or what percentage of a loan consists of interest charges or fees.
Ratio	A fraction: how one number relates to another number; exact proportion. If there are five women for every four men, the ratio of women to men is 5:4, written with a colon (:). This ratio can be represented as the fraction _ 45_ or 1 _14_ or 1,25; or we can say that there are 25% more women than men.
Rebate	To send some money back to a person who has paid too much (v). An amount sent back to someone who has paid too much.
Receipt	Finance: a piece of paper or other evidence sent to show that an amount was paid and that the person who received it (recipient) wishes to acknowledge (show) that they received (got) it.
Remainder	Leftovers. Mathematics: an amount left over after division which cannot be divided further unless one wishes to have a decimal or fraction as a result, i.e. where the divisor does not exactly divide the numerator by an integer (whole number).
Scale	A system of measurement, with regular intervals or gaps between units (subdivisions) of the scale.
Sector	General use: a subdivision. In Economics or Finance: a part of the economy that is responsible for a particular industry or performs a particular service.
Simple interest	Interest charged on the original amount due only, resulting in the same fee every time.
Simplify	To make simpler. Mathematics: to divide throughout by a common factor (number or algebraic letter) that will make the equation easier to read and calculate.
Solution	Mathematics: the step-by-step displaying of calculations to arrive at answers. Common use: the answer to a problem, in the sense of dissolving (removing) a problem.

Solve	To come up with a solution (answer). Show your working.
Square	Mathematics: a shape or figure with four equal sides and only right angles; the exponent 2 (e.g. the square of 4 is 42 = 16).
Squared	Having been multiplied by itself, put to the exponent 2. See square.
Statement	Finance: a summary of transactions (debits and credits, or payments and receipts) made on an account. See account, debit, credit.
Statistics	The mathematics of chance and probability.
Subscript	A number placed below the rest of the line, e.g. CO2
Substitute	To replace.
Substitution	The process of substituting. Mathematics: to replace an algebraic symbol in a formula with a known value or another formula, so as to simplify the calculation. See simplify.
Subtotal	Finance: the total amount due on a statement or invoice, usually without VAT (tax) charges given. Or: a total for a section of an invoice or statement or series of accounts, but not the total of the whole invoice, statement or account.
Sum	To add things up. Represented by Greek Sigma (s): Σ or the plus sign (+).
Superscript	A number placed above the rest of the line, e.g. πr2.
Tally	A total count: to count in fives by drawing four vertical lines then crossing through them with the fifth line.
Tangent	Mathematics: a straight line touching a curve only at one point, indicating the slope of the curve at that point; the trigonometric function of the ratio of the opposite side of a triangle to the adjacent side of a triangle in a right- angled triangle; a curve that goes off the chart.
Tax	A compulsory levy imposed on citizens' earnings or purchases to fund the activities of government.
Taxable	A service, purchase or item or earning that has a tax applied to it.
Transaction	Finance: Exchanging money (payment or receipt); a credit and a debit.
Transfer	To move from one place to another. Finance: usually refers to a payment or credit. See credit, debit, transaction.
Trends	Mathematics: regular patterns within data.
Trigonometry	Mathematics: the relationship and ratios between sides and angles within a right-angled triangle.
UIF	Unemployment Insurance Fund: A government-run insurance fund which employers and employees contribute to, so that when employees are retrenched they can still collect some earnings.
Unit	A subdivision of a scale. See scale.
Variable	A letter used to represent an unknown quantity in algebra; a quantity that changes; subject to change.
Volume	A measure of the space occupied by an object, equal to length x breadth x height.
Watt	Unit of power or rate of use of energy.
Wattage	The amount of power being used, usually rated in kWh. See kWh.
Withdraw	To remove. Finance: to take money out of an account that belongs to you. Compare debit.
Yard	Old Imperial measurement of length, approximately equal to a metre (1,09 m).

4. BASIC MATHEMATICAL SKILLS

4.1. Basic Signs

- If a formula does not have a multiplication (×) sign or a dot-product (·), and yet two symbols are next to each other, it means "times". Thus, m1m2 means *mass* 1 times *mass* 2. You can also write it as *m1* × *m2*, or *m1·m2*
- Comma means the same as decimal point on your calculator.
- (i.e. 4,5 = 4,5). Do not confuse the decimal point with dot product (multiply): 4,5 = 4½ but 4·5 = 20.
- Rather avoid using the dot product for this reason. A variable is something that varies (means: changes). So, for example, the weather is a variable in deciding whether to go to the shops. Variables in science and mathematics are represented with letters, sometimes called algebraic variables. The most common you see in mathematics is x, probably followed by y, z.

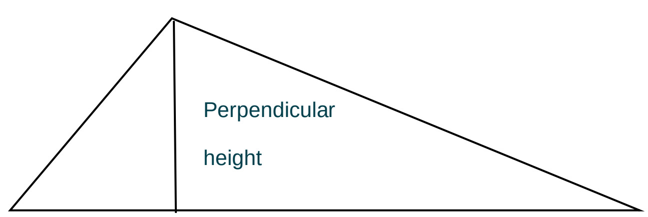
4.1.1. Formulas

- Often in mathematics you have to "make something the subject of a formula" or "solve for something". This refers to finding the value of an unknown quantity if you have been given other quantities and a formula that shows the relationship between them.
- The word 'formula' means a rule for working something out. We work with formulas to draw graphs and also to calculate values such as area, perimeter and volume. You are usually given the formulas in an exam question, so you don't have to remember them, but you do need to select the right numbers to put into the formula (substitute).
- For example, the formula for the area of a triangle is:

Area = ½ base × height.

In this formula:

- the word *Area* stands for the size of the area of a triangle (the whole surface that the triangle covers)
- the word *base* stands for the length of the base of the triangle
- the word *height* stands for the length of the perpendicular height of the triangle.



Base

A formula can be written in letters rather than words, for example:

$$A = \frac{1}{2} b \times h.$$

The quantity on its own on the left is called the subject of the formula.

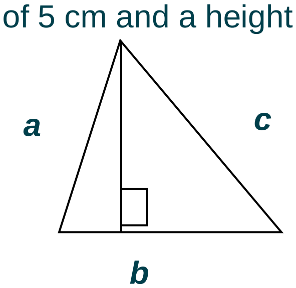
4.1.2. Statistics

- Comma means the same as decimal point on your calculator.
- Dependent variable: The thing that comes out of an experiment, the effect; the results.
- Independent variable(s): The things that act as input to the experiment, the potential causes. Also called the controlled variable.
- Control variable: A variable that is held constant in order to discover the relationship between two other variables. “Control variable” must not be confused with “controlled variable”. Correlation does not mean causation. That is, if two variables seem to relate to each other (they seem to co-relate), it doesn’t mean that one causes the other. A variable only causes another variable if one of the variables is a function f(x) of the other.
- Mean: The average. In the series 1, 3, 5, 7, 9, the mean is 1 + 3 + 5 + 7 + 9 divided by 5 since there are 5 bits of data. The mean in this case is 5.
- Median: The datum (single bit of data) in the precise middle of a range of data. In the series 1, 3, 5, 7, 9, the median value is 5.
- Mode: The most common piece of data. In the series 1, 1, 2, 2, 3, 3, 3, 4, 5, the mode is 3.

4.1.3. Statistics

- The area of a triangle is half the base x the height: a = b/2 (h).

  A triangle with a base of 5 cm and a height of 3 cm will have an area of 2,5 × 3 = 7,5 cm2.



A = *7,5*

b Base 5

h_b Height 3

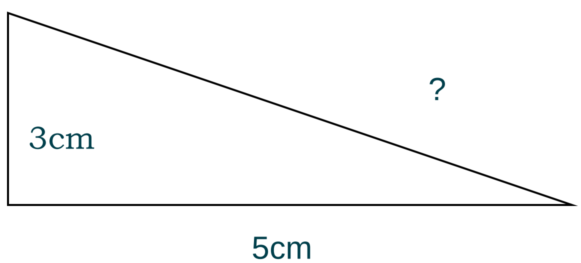
- Lengths of Triangle Sides

  You can calculate the lengths of sides of right-angled triangles using Pythagoras' Theorem. The square of the hypotenuse is equal to the sum of the squares of the other two sides:

  In this diagram: b = base, h_b = height, and c = the hypotenuse:

  $c^2 = h_b^2 + b^2$.

Example



In the triangle shown, the hypotenuse, marked "?", can be obtained by squaring both sides, adding them, and then square-rooting them for the length of the hypotenuse.

That is: $3^2 + 5^2 = 9 + 25 = 34$.
Since in this case 34 = hyp^2 it follows that the square root of 34 gives the value of "?", the hypotenuse.
That is, 5,83cm.

4.1.4. Graphs

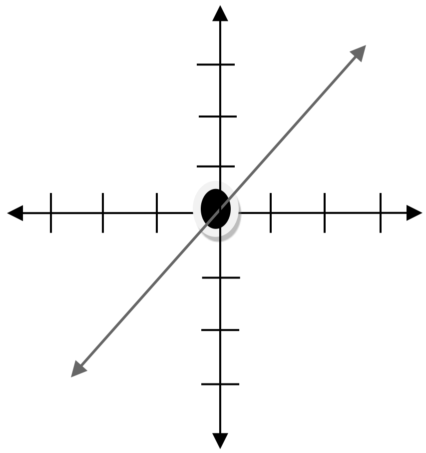
Cartesian Coordinates:

"Coordinates" are numbers that refer to the distance of a point along a line, or on a surface, or in space, from a central point called the "origin".

Graphs that you will use have only two dimensions (directions). The positions of points on these graphs are described using two coordinates:

- How far across (left-to-right) the point is, called the x-coordinate,
- How far up-or-down on the page the point is, called the y-coordinate.

Example:



The following graph shows six points in a straight line.

The coordinates shown can be described using what are called “ordered pairs”.

For example: The furthest point in this graph is 3 units across on the “x-axis” or horizontal line. Likewise, it is also 3 units up on the y-axis, or vertical (up and down) line. Thus, its coordinates are (3;3). The point just below the midpoint or “origin”, is one unit down of the x-axis, and one unit left of the y-axis. So its coordinates are (–1;–1). Note that anything to the left or below of the origin (the circle in the middle), takes a minus sign.

This series of dots look like they are related to each other, because they are falling on a straight line. If you see a result like this in an experimental situation, it usually means that you can predict what the next dot will be, namely, (4;4). This kind of prediction is called “extrapolation”. If you carry out the experiment and find that the result is (4;4), and then (5;5), you have established that there is a strong relation or correlation.

Now, another way of saying that x relates to *y*, or x is proportional to *y*, is to say that *y* is a function of *x*. This is written $y = f(x)$. So, in the example given above, voltage is a function of resistance.

But how is *y* related to *x* in this graph? It seems to be in a 1 to 1 ratio: $y = x$. So, the formula for this graph is $y = x$. In this case, we are only dealing with two factors: $y = x$ and *y*.

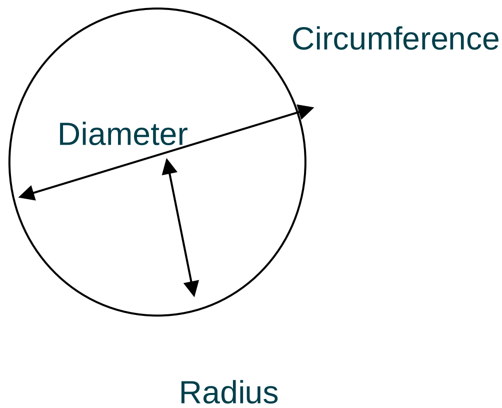
4.1.5. Circles

• Diameter is the width of a circle (2r); radius is half the diameter (d/2).

The edge of a circle is called the “circumference”.
“Diameter” means to “measure across”.
“Diagonal” which means an angle across a square or rectangle, thus “dia-” means

“across”.
“Circumference” means to “carry in a circle”.

- Area of a circle = πr^2
- Circumference = $2 \pi r$
- You can use the above to solve for radius or diameter.

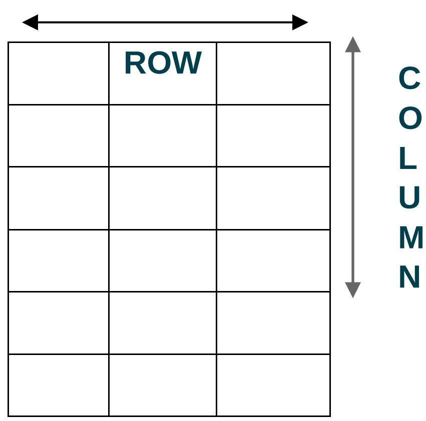


4.1.6. Tables

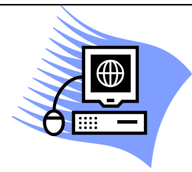
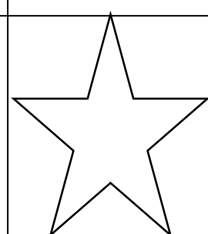
A table is a way of showing information in rows and columns.

Reading a table means finding information in the cells. (Each block in a table is called a cell.) Reading a table is like reading a grid.

Example



QUESTION

	A	B
1.		
2.		
3.		
4.		
5.		

A and B are the column headings.

1, 2, 3, 4, and 5 are the row headings.

- What is in A2? Go across to column A and read down to row 2. A computer.
- What is in B3? A Cow.
- Give the row and column for the star. Row 4 and column A. You can also write A4.
- Give the row and column for the clock. Row 5 and column B. You can also write B5.

Two-way tables are a useful way to display information, and they help you to work out missing information.

These tables show the numbers of two categories for the same sample.

One category is shown in rows, and the other category is shown in columns.

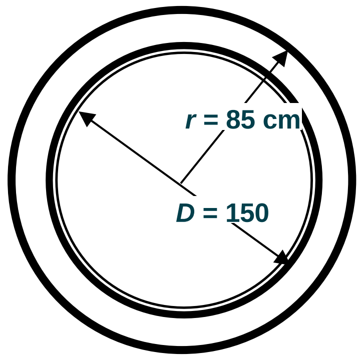
For example, the table below shows how many Grade 10 learners in a school own a cell phone or not and how many of the same learners own a MP3 player or not.

	Own MP3	Do not own MP3	Total
Own a cell phone	57	21	78
Do not own cell phone	13	9	22
Total	70	30	100

EXERCISE 1

Answer the following questions. The answers appear at the end of this unit.

1.1. Daisy made a tablecloth that hangs over the edge of a table of diameter 150 cm. The radius of the tablecloth is 85 cm.



1.1.1 What is the radius of the table?

1.1.2 Calculate the circumference of the tablecloth. Use the formula:
Circumference = 2 $\times$ π $\times$ **radius**, and use $\pi = 3{,}14$

1.1.3 Calculate the area of the tablecloth. Use the formula:
Area = π $\times$ **(radius)**^{2}, and use $\pi = 3{,}14$
Give your answer correct to the nearest whole number.

1.1.4. Calculate the length of the tablecloth that hangs over the edge of the table.

1.1.5. It cost Daisy R60,00 to make the tablecloth. The same tablecloth sells for R99,99 in the linen shop. How much money did Daisy save by making the tablecloth herself?

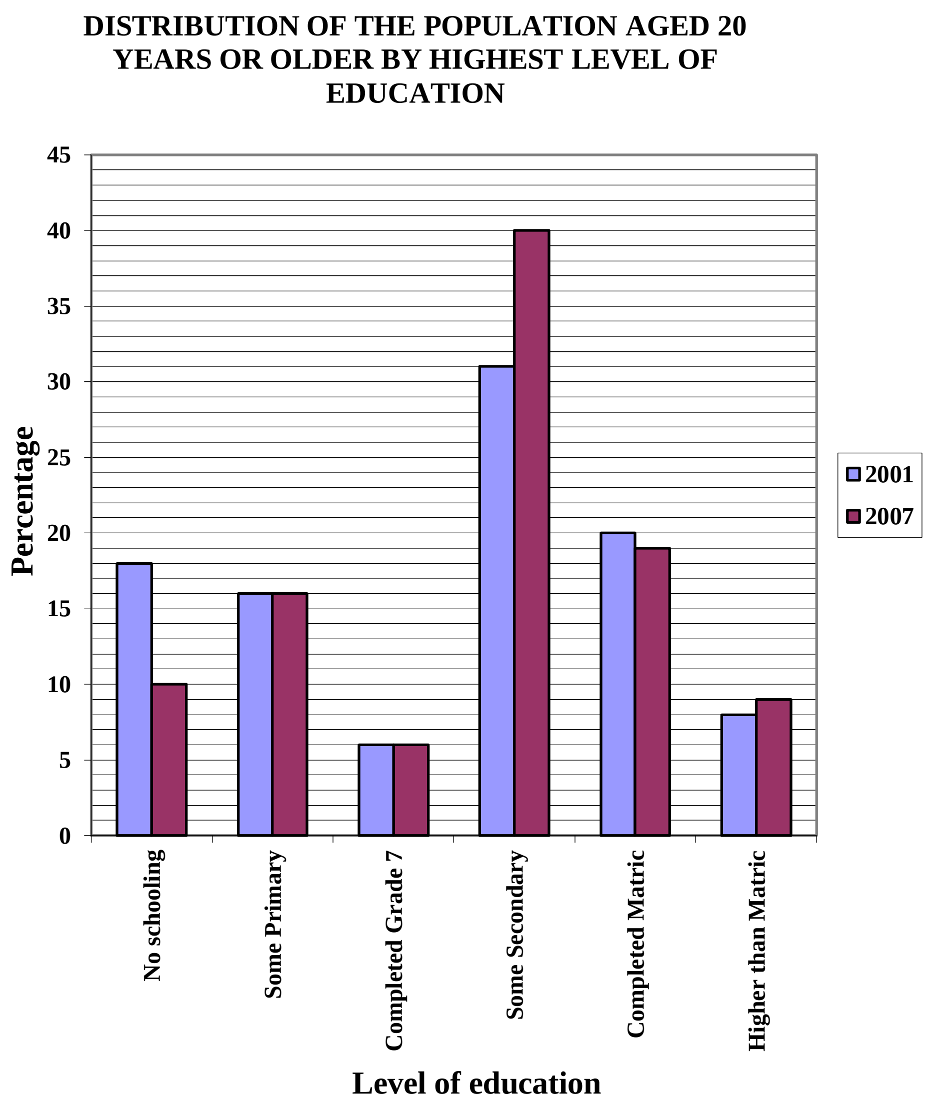
EXERCISE 2

2.1 In 2001, what percentage of the population had no schooling?

2.2 Which level of education has the same percentage in both 2001 and 2007?

2.3 Which level of education had the greatest increase in percentage from 2001 to 2007?

2.4 In 2007, what percentage of the population aged 20 years or older had some secondary education or higher?



MEMORANDUM TO EXERCISE 1 AND 2

EXERCISE 1

1.1 Radius = $\frac{1}{2} \times$ diameter

$= \frac{1}{2} \times 150$ cm

= 75 cm

1.2 Circumference = $2 \times \pi \times$ radius

$= 2 \times 3,14 \times 85$ cm

= 533,8 cm

1.3 Area = $\pi \times (\text{radius})^2$

$= 3,14 \times (85)^2$ cm^2

= 22 686,5 cm^2

= 22 687 cm^2

1.4 Length of overlap = 85 cm – 75 cm

= 10 cm

1.5 Savings = R99,99 – R60,00

= R39,99

EXERCISE 2

2.1 18%

2.2 Some primary school education.

2.3 Some secondary school education.

2.4 Total = 40% + 19% + 9% = 68%

UNIT 2: NUMBERS AND CALCULATIONS

LEARNING OBJECTIVES

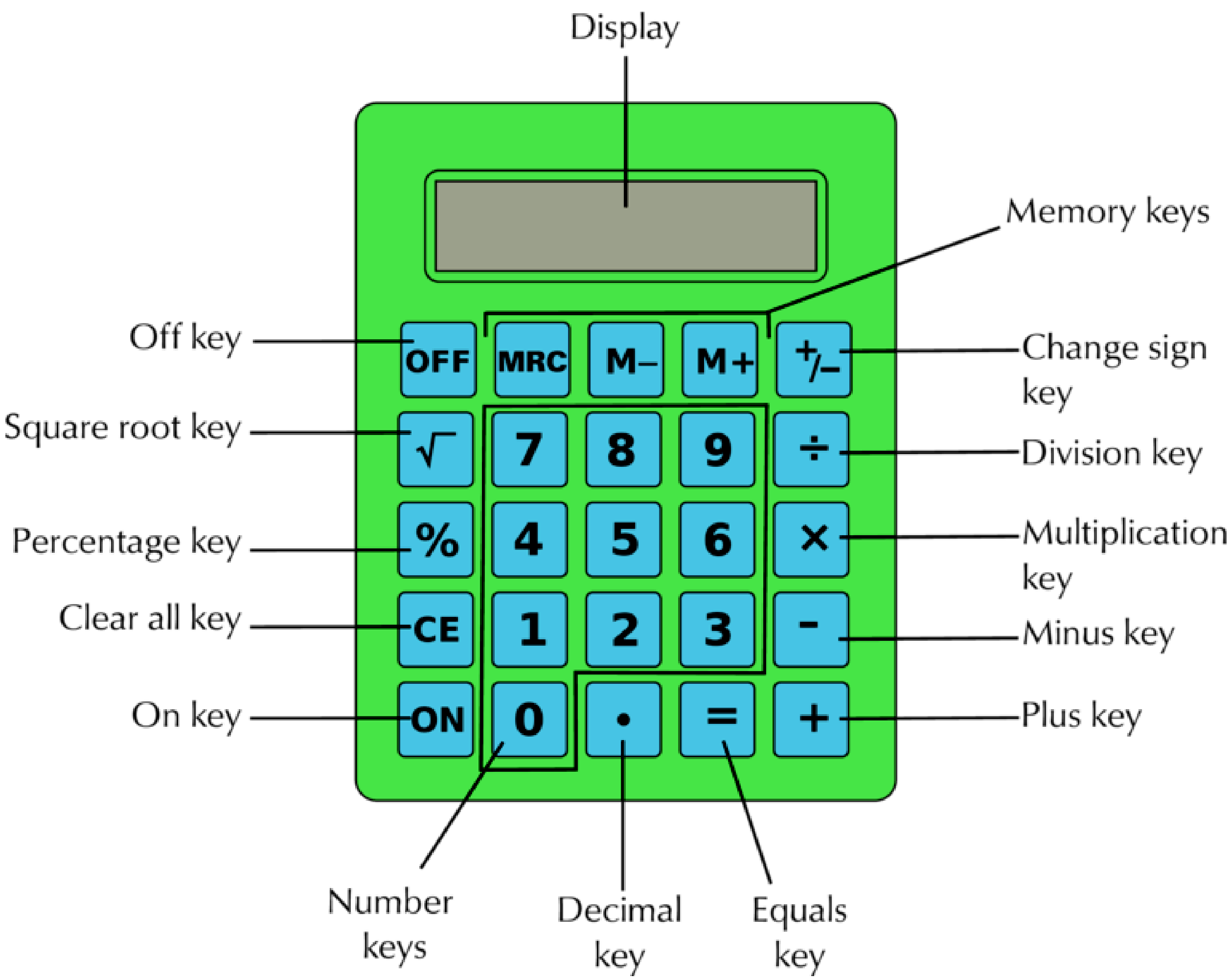
At the end of this unit, you should be able to:

- Use and apply the basic calculator functions.
- Add, subtract, multiply and divide common fractions.
- Apply the BODMAS calculation rules.
- Complete calculations with decimals.
- Convert from percentages to decimals.
- Complete calculations using percentages.

You should spend more or less 4 hours on this unit

1. USING A CALCULATOR

Example: Basic calculators usually have the following parts:



The basic operations are +, –, × and ÷. More advanced functions are √, % and [+/–].

NB! Large numbers can look different on a calculator display, for example 24 900 may look like this: 24900 or 24’900.

How to use the memory keys on your calculator

The memory keys (M+, M, and MRC) allow you to do calculations in the calculator's memory.

- The M+ key is used to add a number to the memory, or to add it to a number already in the memory.
- The M key is used to subtract a number from the number in memory.
- If you press the MRC key once, the calculator displays the number stored in memory. If you press this key twice, the calculator's memory is cleared.
- When you use a memory key, the letter 'M' appears at the top of the display screen, showing that the number on the display has been stored in the calculator's memory. This means that we can do longer calculations without having to write down the steps in between. It also gives you a way of doing calculations in the right order.

NB! Always clear the calculator's memory by pressing MRC twice, else you will end up with unexpected and incorrect answers.

EXAMPLE

Show the correct key sequence on your calculator for working out: $200 + (2 \times 80) - 60$

Solution

- Enter 200 into calculator and add it to the memory by pressing M+.
- Calculate 2×80 and add it to the memory by pressing M+.
- Then enter 60 and subtract it from the memory by pressing M–.
- Press MRC to show the answer stored in the memory: 300.
- The complete sequence of keys will be: 200 [M+] 2 [×] 80 [M+] 60 [M–] [MRC]

Compare the key sequence in the previous example to the key sequence: $200 + 2 \times 80 - 60$. The memory key allows you to work without brackets.

How to use brackets in calculations

Brackets are used to show the order in which operations happened in a situation. We want to show that Roxanne should multiply the stall rental by 3 before subtracting it from the profit:

$40\ 000 - (2000 \times 3) = 34\ 000$

Example

Roxanne makes hand-crafted toys and sells them at three market stalls. She wants to calculate the amount of profit received by her business after the rental costs. Her initial profit is R 40 000. Each stall costs her R 2000 in rental. She does the following calculation on her calculator:

$40\ 000 - 2000 \times 3 = 114\ 000$

She is very puzzled. How can she have more profit than she started with?

The calculator does the calculations in exactly the same order as they are keyed in:

$40\ 000 - 2000 = 38\ 000$

$38 \times 3 = 114\ 000$

This means that she was multiplying the remaining profit by 3, rather than just the rental!

In this context, however, Roxanne wanted to find the total rental for the 3 stalls (2000×3) and then subtract that from 40 000, getting an answer of R 34 000.

How to use BODMAS

If there are no brackets in a calculation, we use the BODMAS rule to remember in which order we must perform operations.

This rule states what the order must be:

B → Brackets

O → Of or orders: Powers, roots, etc.

$\left.\begin{array}{l}\text{D}\\\text{M}\end{array}\right\}$ → Division and Multiplication

$\left.\begin{array}{l}\text{A}\\\text{S}\end{array}\right\}$ → Addition and subtraction

NB! If there are brackets involved then we must do the operation in the brackets first; then do the multiplication or division (it doesn't matter what the order is); and last, do the addition or subtraction (in any order).

Example

Bonile wrote this number sentence to show the cost of some items that he bought:

Cost $= 4 \times \text{R } 160 + 5 \times \text{R } 85$

Work this out using the correct order of operations.

Solution

Using BODMAS, calculate the multiplication parts before the addition parts.

$$\begin{aligned} \text{Cost } &= 4 \times \text{R } 160 + 5 \times \text{R } 85 \\ &= \text{R } 640 + \text{R } 425 \\ &= \text{R } 1065 \end{aligned}$$

Using brackets makes this easier to see, but they are not necessary:

$$\begin{aligned} \text{Cost } &= (4 \times \text{R } 160) + (5 \times \text{R } 85) \\ &= \text{R } 640 + \text{R } 42 \\ &= \text{R } 1065 \end{aligned}$$

2. COMMON FRACTIONS

A fraction is a part of a whole and it measures how something is divided into parts.

The top number of a fraction is called the Numerator. The Numerator indicates the number of parts of the whole that is used.

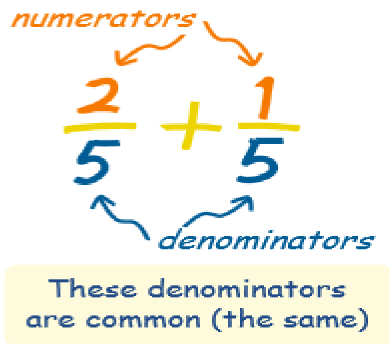
The bottom number of a fraction is called the Denominator. The Denominator indicates the number of equal parts the whole is divided into.

$$\frac{3}{4}$$

Numerator: 3 (Thus three parts of the whole are used.)

Denominator: 4 (Thus the whole is divided into four parts.)

A Common Fraction is a fraction where both the numerator and the denominator are integers. (An integer is a whole number.) The example above is a common fraction.



A Common Denominator is when the denominators of two or more fractions are the same.
For example: $\frac{1}{4}$ and $\frac{3}{4}$ have common denominators. Common denominators are important for adding and subtracting of fractions.

Equivalent Fractions: Certain fractions are the same, although the look different.
For example:

$$\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$$

Adding Fractions

Adding fractions with the same denominator:

$$\frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$$

$$\frac{5}{8} + \frac{1}{8} = \frac{6}{8} = \frac{3}{4}$$

Adding fractions with different denominators:
The denominators must be the same and a common denominator must be found. To determine the common denominator, list the multiples of the current denominators and find the smallest number that is the same in both the multiples.

$$\frac{1}{3} + \frac{1}{6}$$

Step 1: List the multiples of 3: 3,6,9,12,15,18,21
Step 2: List the multiples of 6: 6,12,18,24,30,36

Step 3: The smallest common number is: 6 Thus, 6 is the least common denominator.
Step 4: Thus, $3 \times 2 = 6$ (New denominator). Multiply the top integer as well by 2:
$1 \times 2 = 2$ (New numerator)
Step 5: $\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$

Answer: $\frac{3}{6}$

$$\frac{1}{6} + \frac{7}{15}$$

Step 1: List the multiples of 6: 6,12,18,24,30,60
Step 2: List the multiples of 15: 15,30,45
Step 3: The least common denominator is 30.
Step 4: Thus: $6 \times 5 = 30$ and $1 \times 5 = 5$ Thus: $\frac{5}{30}$
Thus: $15 \times 2 = 30$ and $7 \times 2 = 14$ Thus: $\frac{14}{30}$
$\frac{1}{6} + \frac{7}{15} = \frac{5}{30} + \frac{14}{30} = \frac{19}{30}$

NB! What is done to the denominator, must be done to the numerator.

Subtracting Fractions

Step1: Ensure that the denominators are the same.
Step 2: Subtract the numerators and put the answer over the same denominator.
Step 3: Simplify the fraction if needed.

Examples

$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ Simplify: $\frac{1}{2}$

$\frac{1}{2} - \frac{1}{6} = \frac{3}{6} - \frac{1}{6} = \frac{2}{6}$ Simplify: $\frac{1}{3}$

Multiplication of Fractions

Step 1: Multiply the numerators with one another.
Step 2: Multiply the numerators with one another.
Step 3: Simplify the fraction if needed.

Examples

$\frac{1}{3} \times \frac{9}{16}$

$1 \times 9 = 9$

$3 \times 16 = 48$

$\frac{9}{48}$ Simplify: $\frac{3}{16}$

$\frac{3}{4} \times \frac{6}{8}$

$3 \times 6 = 18$
$4 \times 8 = 32$

$\frac{18}{32}$ Simplify: $\frac{9}{16}$

Dividing Fractions

Step 1: Turn the second fraction upside down. It now becomes a reciprocal.
Step 2: Multiply the first fraction by the reciprocal.
Step 3: Simplify the fraction if needed.

Examples

$\frac{1}{2} \div \frac{1}{6}$

$\frac{1}{6}\ becomes\ reciprocal: \frac{6}{1}$

$\frac{1}{2} \times \frac{6}{1} = \frac{6}{2}$

Simplify: 3

$\frac{1}{8} \div \frac{1}{4}$
$\frac{1}{4}\ becomes\ reciprocal: \frac{4}{1}$

$$\frac{1}{8} \times \frac{4}{1} = \frac{4}{8}$$

Simplify: $\frac{1}{2}$

Multiplication and Division of Fractions and Whole Numbers

NB! Always notate the whole number as a fraction by putting it over 1

Examples

$$\frac{2}{3} \times 5$$

$$\frac{2}{3} \times \frac{5}{1}$$

$$\frac{10}{3}$$

$$3 \times \frac{2}{9}$$

$$\frac{3}{1} \times \frac{2}{9}$$

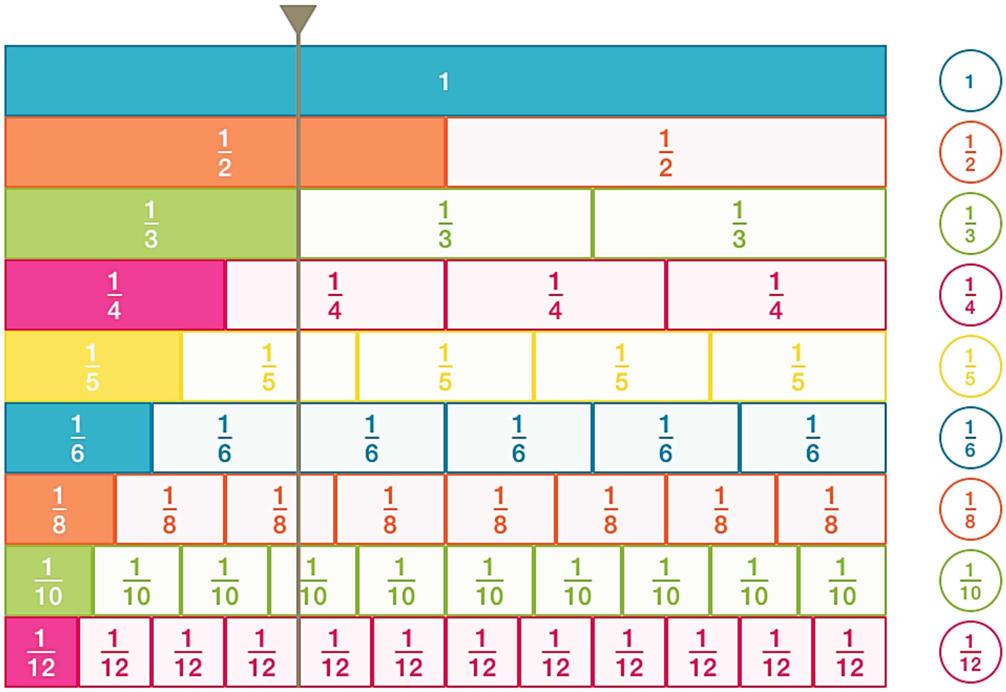
$\frac{6}{9}$ Simplify: $\frac{2}{3}$

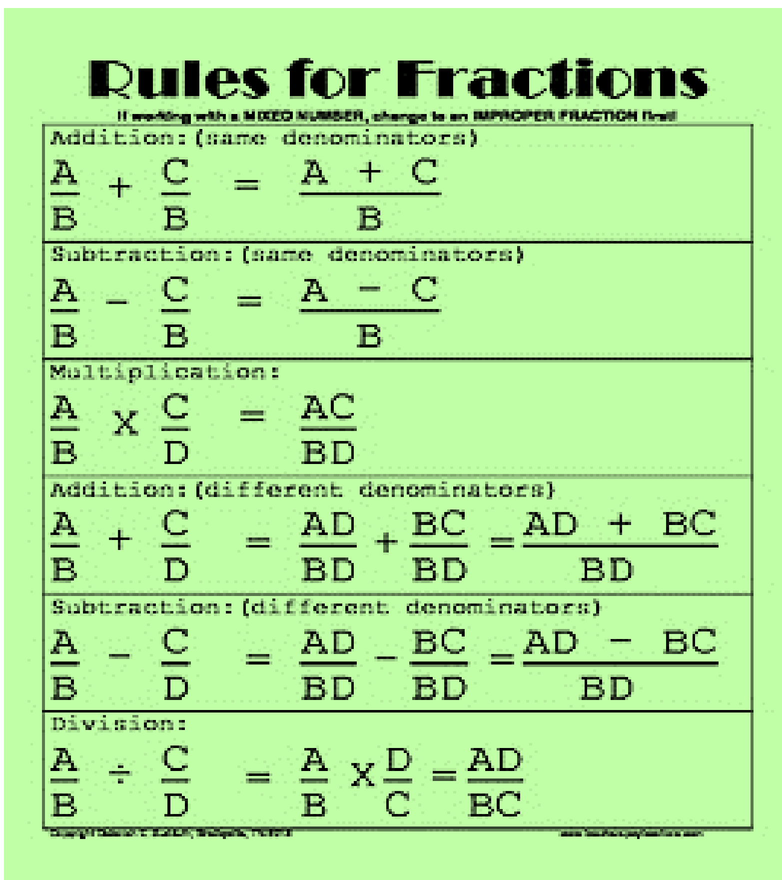
$$\frac{2}{3} \div 5$$

$$\frac{2}{3} \div \frac{5}{1}$$

$$\frac{5}{1}\ becomes\ reciprocal: \frac{1}{5}$$

$$\frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$$





Rules for Fractions

If working with a MIXED NUMBER, change to an IMPROPER FRACTION first!

Addition: (same denominators)

$$\frac{A}{B} + \frac{C}{B} = \frac{A + C}{B}$$

Subtraction: (same denominators)

$$\frac{A}{B} - \frac{C}{B} = \frac{A - C}{B}$$

Multiplication:

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Addition: (different denominators)

$$\frac{A}{B} + \frac{C}{D} = \frac{AD}{BD} + \frac{BC}{BD} = \frac{AD + BC}{BD}$$

Subtraction: (different denominators)

$$\frac{A}{B} - \frac{C}{D} = \frac{AD}{BD} - \frac{BC}{BD} = \frac{AD - BC}{BD}$$

Division:

$$\frac{A}{B} \div \frac{C}{D} = \frac{A}{B} \times \frac{D}{C} = \frac{AD}{BC}$$

3. DECIMALS

A decimal number contains a decimal point.

Forty-five and six-tenths written as a decimal value: 45.6

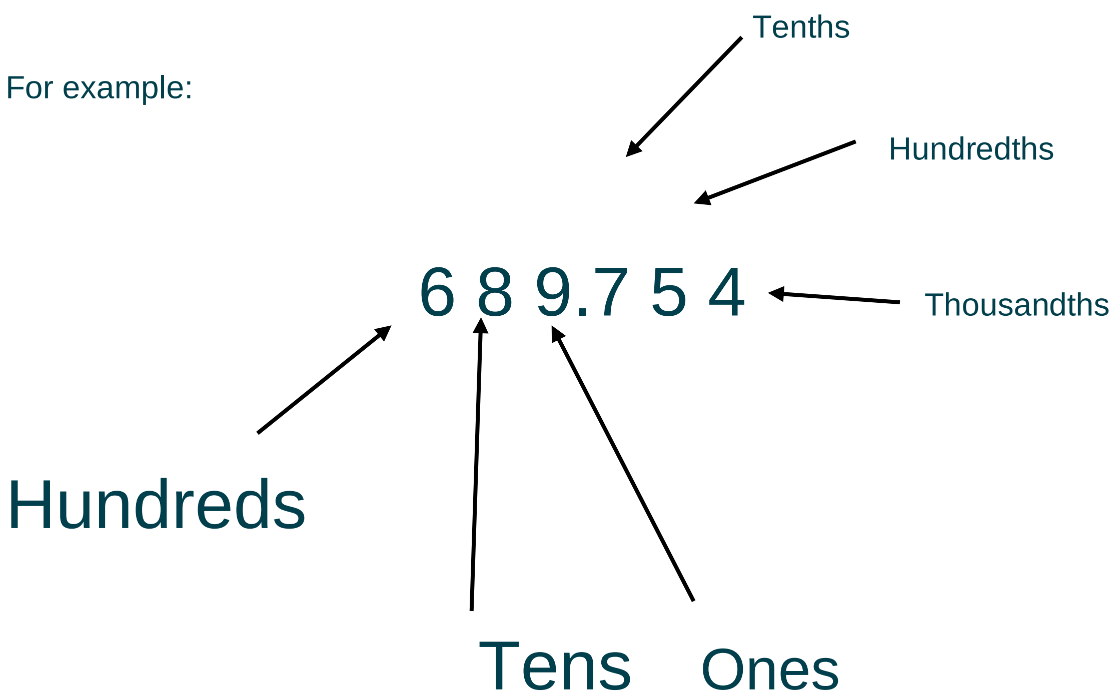
The decimal point goes between the Ones and Tenths:
46.6 has 4 Tens, 5 Ones and 6 Tenths.

Thus, it could be written as follows:

$$45.6 = 40 + 5 + \frac{6}{10}$$

The position of each digit in a number is important. Tens are 10 times bigger than Ones and Hundreds are 10 times bigger than Tens. Tenths ($\frac{1}{10}$) are 10 times smaller than Ones.

For example:



Thus, 0.1, for example is exactly the same as $\frac{1}{10}$.

Examples

1. What is 4.8? It is 4 and 8 tenths.
2. What is 82.76? It is 82 and 7 tenths and 6 hundredths.

As fractions, the above numbers will be written as follow:

1. 4 and $\frac{8}{10}$
2. 82 and $\frac{76}{100}$

Therefore,

- To multiply by 10, every digit moves to the left by one decimal place.
- To multiply by 100, every digit moves to the left by two decimal places.
- To multiply by 1000, every digit moves to the left by three decimal places.

Commonly used values in Percentage, Decimal and Fraction form:

Percentage	Decimal Value	Fraction
1%	0.01	$\frac{1}{100}$
5%	0.05	$\frac{1}{20}$
10%	0.1	$\frac{1}{10}$
12.5%	0.125	$\frac{1}{8}$
20%	0.2	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
33.5%	0.333…	$\frac{1}{3}$
50%	0.5	$\frac{1}{2}$

75%	0.75	$\frac{3}{4}$
80%	0.8	$\frac{4}{5}$
90%	0.9	$\frac{9}{10}$
99%	0.99	$\frac{9}{100}$
100%	1	$\frac{1}{1}$
125%	1.25	$\frac{5}{4}$
150%	1.5	$\frac{3}{2}$
200%	2	$\frac{2}{1}$

4. PERCENTAGES

A percentage is a number that is represented as a part of 100. So we can deduce that 50% means 50 per 100 or out of 100, 25% means 25 per 100 and 100% means 100 per 100 (everything or all). Percentage is indicated by a % sign. Percentages are used to calculate tax, VAT and other taxes. It is also used to make comparisons.

85% = $\frac{85}{100}$ (The percentage is written with a denominator of 100)

Common percentage amounts written as fractions and decimals

$$75\% = \frac{75}{100} = \frac{3}{4} = 0.75$$

$$50\% = \frac{50}{100} = \frac{1}{2} = 0.5$$

$$25\% = \frac{25}{100} = \frac{1}{4} = 0.25$$

$$10\% = \frac{10}{100} = \frac{1}{10} = 0.1$$

$$5\% = \frac{5}{100} = \frac{1}{20} = 0.05$$

The percentage formula may be illustrated as follows:

$$\frac{Part}{Whole} = \frac{\%}{100}$$

Calculations involving percentages

- *Finding percentage amounts:*

Susan gets 16 marks out of 25 for a Mathematical Literacy assignment. Calculate the percentage she achieved.

Turn the marks achieved into a fraction: $\frac{16}{25}$
Turn the fraction into a fraction with 100 as denominator by multiplying both the denominator and numerator by 4 (25 × 4 = 100): $\frac{16\times4}{25\times4} = \frac{64}{100}$

So, Susan achieved 64% in her assignment.

NB! The fraction value was not changed; an equivalent fraction is used.

Mark received 53 marks out of 63 for a History test. Calculate the percentage.

$$\frac{53}{63} \times \frac{100}{100} \quad = \quad 53 \div 63 \times 100\%$$
$$= 84.12\% \; (84\% \; rounded\ off\ to\ the\ nearest\ whole\ number)$$

Mark received 84% for his History test.

NB!	To change a fraction to a percentage, divide the numerator by the denominator and multiply by 100%.

- Finding a percentage amount:

Paul had dinner at Spur and his bill amounted to R127.30. He tipped the waiter 10%. Calculate the value of the tip.

$$\frac{10}{100} \times R127.30 = R12.73$$

The waiters tip was R12.73.

Toetsie wants to purchase a new computer. The price of the computer she wants to purchase is R14 700.00 plus VAT. The VAT percentage is 14%. Calculate the total cost Toetsie will have to pay for the computer.

$$VAT = 14\%\ of\ R14\,700$$

$$VAT = \frac{14}{100} \times R14\,700\ = R2\,058.00$$

$$VAT = R14\,700 + R2\,058$$

$$= R\ 16\,758.00\ Total\ cost\ of\ the\ computer$$

Orange Rose Boutique is offering a discount of 7.65% on evening dresses. Anny wants to purchase a dress of the amount of R40 899.00. Calculate the discounted price for the dress.

$$Discount = \frac{7.65}{100} \times R40\,899 = R\ 3\,128.77$$

$$Discounted\ Price: R40\,899 - R3\,128.77$$

R37 770.23 Discounted price for the dress.

- Calculate an original amount before a percentage change:

The price of a house Bernard wants to buy, is R758 649.00 including VAT. Calculate the cost of the house before VAT. (VAT is 14%).

100% + 14% = 114% of the cost before VAT.

114% of the price excluding VAT = R758 649

1% of the price excluding VAT = $\frac{758649}{114} \times 100$

R665 481.58 cost of the house excluding VAT.

Nonno's car insurance is R458.00 per month. This amount includes a company insurance premium tax of 6%. Calculate the cost of the car insurance without the 6% tax.

$$\frac{458}{106} \times 100 = R432.08\ \textit{car insurance without company insurance tax}$$

Bebe has a jewellery sale and a gold ring was discounted with 23% so that the sale price is R12 522.00. Calculate the original cost of the gold ring.

NB! R12,522 is 77% of the original cost. (23% - 100% = 77%)

$$\frac{12522}{77} \times 100 = R16\,262.34\ \textit{was the original cost}$$

- Expressing a change as a percentage:

To calculate the percentage by which anything was increased or decreased, the following rule is used:

$$\frac{\textit{Actual increase or decrease}}{\textit{Original Cost}} \times 100\%$$

The Oliver Trust Estate is valued at R8 567 699.00. Five years ago. The same estate was valued at R2 658 312.00.
Calculate the percentage increase in the value of the Estate over the past five years.

$$Percentage\ increase = \frac{8567699 - 2658312}{2658312} \times 100$$

$$= \frac{5909387}{2658312} \times 100$$

$$= 222.3\%\ increase\ over\ the\ past\ five\ years$$

Henry's car was R150 000. Now, three years later, his car's value decreased to R98 000. Calculate the percentage decrease.

$$Percentage\ decrease = \frac{150000 - 98000}{150000} \times 100$$

$$= \frac{52000}{150000} \times 100$$

$$= 34.7\%\ decrease\ over\ the\ past\ three\ years$$

NB! Always use the units of measurements in the final answer.

UNIT 3: NUMBERS AND CALCULATIONS

LEARNING OBJECTIVES

At the end of this unit, you should be able to:

- Calculate ratios, proportions and rates.
- Round off to the nearest ten.
- Calculate and convert squares, square roots and cubes.
- Identify prime numbers, perfect squares and perfect cubes.

You should spend more or less 4 hours on this unit.

1. RATIO, PROPORTION AND RATE

1.1. Ratios

A ratio is used to compare quantities with each other.

For example, if 21 sweets are shared between Thoko and Thandi in the ratio 2 : 5, then for every two sweets Thoko receives, Thandi receives five sweets. Thoko will get six sweets and Thandi will get fifteen sweets. The ratio of the actual number of sweets received by each individual is 6 : 15 and this is called the absolute ratio as the ratio is comparing the actual number of objects (sweets). The ratio of 2 : 5 is called a simplified or reduced ratio that informs that for every two sweets Thoko receives there are five given to Thandi.

NB!	The ratio is always in the order of the objects or people that is compared. In the above example, Thoko is mentioned first, therefore the ratio starts with Thoko's share which is 2 or 6. Thandi's ratio is mentioned last as she is mentioned after Thoko.

Ratios may be written with ":", or the word "to" or as a fraction:

Thus, 6 : 15 may be written as 6 to 15 or as $\frac{6}{15}$.

When simplifying a ratio, it is important to remember to multiply or divide both sides by the same number. The number used will be the smallest number that can be divided into both sides of the ratio. With multiplication, both sides will be multiplied by the same number. In essence, therefore, the ratio will still be the same as the original.

Thus, we can work with ratios by multiplying or dividing each part of the ratio by the same number. The ratio 1 : 4 is the same as the ratio 5 : 20 and they are called equivalent ratios (each side was multiplied by 5).

The quantities compared in a ratio need to have the same units for example the ratio of litres to litres, or rand to rand etc. If the quantities are not the same, it has to be converted the units to make them the same, for example the ratio of 5 cm to 20 mm = 50 mm : 20 mm = 5 : 2.

Ratios are also used to compare three quantities in a fixed ratio.

Example

Suzie wants to share R800 between her three grandchildren in the ratio of their ages: 20 years, 15 years and 5 years. Calculate how much each should get.

Simplify the ratio 20:15:5 (Divide by smallest common number – 5): 4:3:1

Total number of parts: 4+3+1 = 8

R800 are shared as follow:

$$\frac{4}{8} \times R800 = R400$$

$$\frac{3}{8} \times R800 = R300$$

$$\frac{1}{8} \times R800 = R100$$

The shares add up to R800.

1.2. Proportions

Proportions are used to solve problems involving ratios. A proportion is an equation stating that two ratios are equal or 'in proportion'. In its simplest form, a proportion is an equation with a ratio on each side.

Example

The ratio of wheels to cars is 4 : 1. There are 12 wheels in stock. Calculate the number of cars that can be equipped with wheels.

Use x to portray the missing number of cars:

$$\frac{4}{1} \times \frac{12}{x}$$

Use cross-multiplication: $4 \times x = 4x$ and $1 \times 12 = 12$

Put the answers in a ratio: $12 : 4x$

Solve x by dividing each side by 4: $x = 3$
3 Cars can be equipped.

1.3. Rates

Rate compares quantities with different measuring units. We usually reduce the rate to a quantity per one unit. Examples of rates are cost rates and speed.

For example:

A car's speed might be 60 km/h (kilometres per hour). This means that for every hour of driving, a distance of 60 km is covered.

A cost rate example is to calculate the unit cost rate for 2kg of flour at R20.00.

$R20: 2kg = R10: 1kg$

The unit rate is R10/kg.

Equations associated with rates

- $Distance + Speed \ \times Time$
- $Time = \frac{Distance}{Speed}$
- $Speed = \frac{Distance}{Time}$

2. ROUNDING OFF ACCORDING TO THE CONTEXT

Rounding means making a number simpler, but at the same time to keep its value close to what is was.

For example:

74 will round off to 70.
The reason for this is that 73 is closer to 70 than 80.
Everything from 1 to 4 rounds down to the nearest 10 and all numbers from 5 to 9 rounds up to the nearest 10.
The number 1.239 will be rounded off to two decimal places of 1.24.

When rounding off numbers, it is important to always be aware of the context in which the numbers are used. Practical, real-life situations will demand a general knowledge of the context in which numbers are used. The answers must always be reasonable as to make sense in the context.

For example:

1c, 2c and 5c coins are no longer in use. Total must be rounded down to the nearest 10. For the cash payment of R13.69, the customer will pay R13.60. If the customer is paying via credit or debit card, the totals are not rounded off.

3. SQUARES AND CUBES OF NUMBERS

3.1. Square Roots of Numbers

The square root of any number is the number multiplied by itself. For example, 4^2 $means\ 4\ squared\ or\ 4\ \times 4 = 16$

Another method: $\sqrt{16} = 4\ because\ 4\ \times 4 = 16$

NB! The number within a square root or cube root ($\sqrt{\ }$) are divided to find the number's square root.

Square Roots of Perfect Squares from 1 to 100:

$\sqrt{1} = 1\ as\ 1^2 = 1$

$\sqrt{4} = 2\ as\ 2^2 = 4$

$\sqrt{9} = 3\ as\ 3^2 = 9$

$\sqrt{16} = 4\ as\ 4^2 = 16$

$\sqrt{25} = 5\ as\ 5^2 = 25$

$\sqrt{36} = 6\ as\ 6^2 = 36$

$\sqrt{49} = 7\ as\ 7^2 = 49$

$\sqrt{64} = 8\ as\ 8^2 = 64$

$\sqrt{81} = 9\ as\ 9^2 = 81$

$\sqrt{100} = 10\ as\ 10^2 = 100$

Prime Numbers between 1 and 100

A prime number is a whole number greater than 1, whose only two whole-number factors are 1 and itself.

Thus, the number can only be divided by 1 and itself.

The following are prime numbers:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 71, 73, 79, 83, 89, 97.

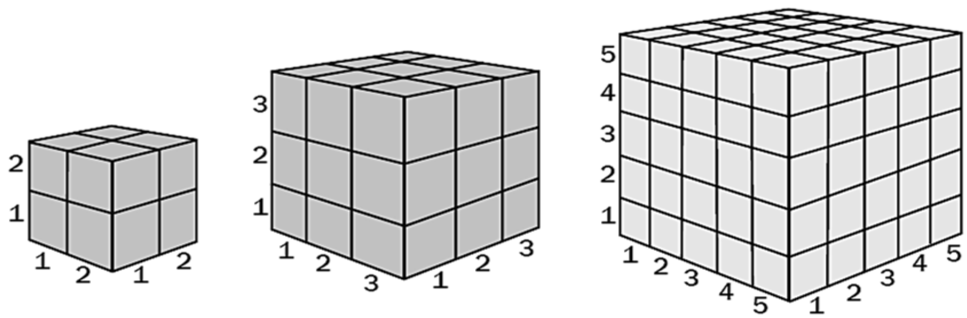
3.2. Square Roots of Numbers

To cube a number, the number is multiplied by 3.

For example:

3 cubed = $3 \times 3 \times 3 = 27$

It is written as follow: 3^3



$2^3 = 2 \times 2 \times 2 = 8$ $3^3 = 3 \times 3 \times 3 = 27$ $5^3 = 5 \times 5 \times 5 = 125$

The cube root of a number is a value that gives the original number when cubed:
$\sqrt[3]{27} = 3$

Perfect Cubes include the following

$\sqrt[3]{1} = 1\ as\ 1^3\ is\ 1$

$\sqrt[3]{8} = 2\ as\ 2^2\ is\ 8$

$\sqrt[3]{27} = 3\ as\ 3^3\ is\ 27$

$\sqrt[3]{64} = 4\ as\ 4^3\ is\ 64$

$\sqrt[3]{125} = 5\ as\ 5^3\ is\ 125$

$\sqrt[3]{216} = 6\ as\ 6^3\ is\ 216$

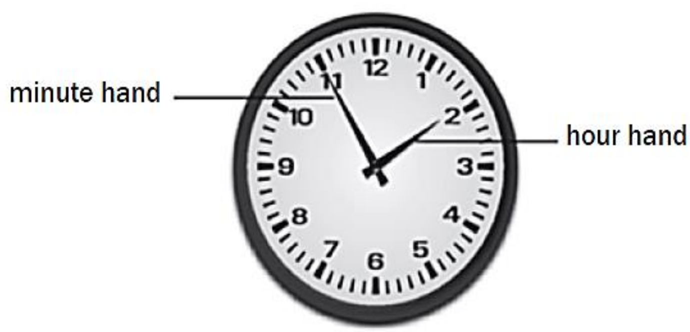
$\sqrt[3]{343} = 7\ as\ 7^3\ is\ 343$

$\sqrt[3]{512} = 8\ as\ 8^3\ is\ 512$

$\sqrt[3]{729} = 9\ as\ 9^3\ is\ 729$

$\sqrt[3]{1000} = 10\ as\ 10^3\ is\ 1000$

4. TIME



Time values are expressed in many different formats.

For example, 9 o'clock, 09:00 am, 09:00 pm and 21:00. The two most common formats are the 12-hour format and the 24-hour format.

12-Hour Format

The letters a.m. are used to indicate the time before midday and the letters p.m. are used to indicate time after midday. These formats are used on analogue clocks and watches.

Analogue 12-hour watch

Digital 12-hour clock

24-Hour Format

This format is seen on digital watches, clocks and stopwatches. The number on the left indicates the hour and the number on the right indicates the minutes.

24-hour	12-hour
01:00	01:00am
02:00	02:00am
03:00	03:00am
04:00	04:00am
05:00	05:00am
06:00	06:00am
07:00	07:00am
08:00	08:00am
09:00	09:00am
10:00	10:00am
11:00	11:00am
12:00	12:00noon
13:00	01:00pm
14:00	02:00pm
15:00	03:00pm
16:00	04:00pm
17:00	05:00pm
18:00	06:00pm
19:00	07:00pm
20:00	08:00pm
21:00	09:00pm
22:00	10:00pm
23:00	11:00pm
24:00	12:00 midnight

Conversion of units of time

- 60 seconds = 1 minute
- 60 minutes = 1 hour
- 30 minutes = ½ an hour
- 15 minutes = ¼ of an hour
- 24 hours = 1 day
- 7 days = 1 week
- 365 days = 52 weeks = 12 months = 1 year

Examples

Write the following times in 24-hour formats:

9:56 pm 21:56

8:30 am 08:30

4:05 pm 16:05

Write the following times in 12-hour formats:

14:45 02:45 pm

10:25 10:25 am

19:35 07:35 pm

Convert 140 seconds to minutes and seconds.

$$\frac{140}{60} = 2\ minutes\ 20\ seconds$$

Convert 138 minutes to hours and minutes.

$$\frac{138}{60} = 2\ hours\ 18\ minutes$$

Convert 34 hours to days and hours.

$$\frac{34}{24} = 1\ day\ 10\ hours$$

Jasmine goes to the salon and spend 2 hours 46 minutes and 02 seconds on her hair, 1 hour 03 minutes and 45 seconds on a facial and 3 hours 58 minutes and 16 seconds doing her nails.

How long was she at the salon?

$$2\ h\ 46\ min\ 02\ sec + 1\ h\ 03\ min\ 45\ sec + 3\ h\ 58\ min\ 16\ sec$$

$$
\begin{aligned}
&\quad 2h\ 46\ min\ 02\ sec \\
&+ 1\ h\ 03\ min\ 45\ sec \\
&+ 3\ h\ 58\ min\ 16\ sec \\
\hline
&= 7\ h\ 08\ min\ 03\ sec
\end{aligned}
$$

UNIT 5: YOUR TURN

LEARNING OBJECTIVES

At the end of this unit, you should be able to:

- Answer questions on topics covered in Module 1.
- Apply knowledge gained in Module 1.

You should spend more or less 5 hours on this unit.

EXERCISE 1

1. QUESTION 1

1.1. Nicky buys a bicycle on lay-bye for R3 200. He pays a deposit of R750 and afterwards chose to pay R300 monthly to cover the balance.

1.1.1. Express the deposit as a percentage of the purchase price.

1.1.2. Determine the balance, after the deposit has been paid.

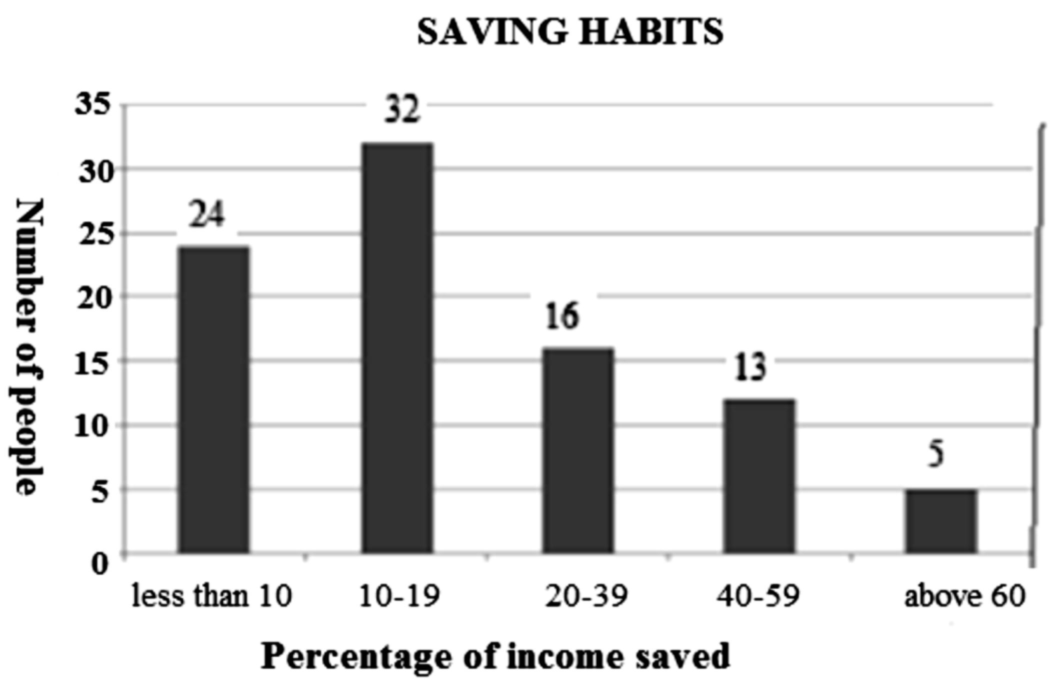
1.1.3. Determine the total amount paid after the deposit and five instalments has been paid.

1.2. A caretaker at a school is paid at the rate of R26 per hour worked. He works from 7:30 am for 7 hours, excluding a 15-minute tea break and 45-minute lunch break. He does not work during weekends.

1.2.1. Determine the time when the caretaker goes off duty.

1.2.2. Calculate the care-taker's income if he worked for four weeks.

1.3. A research was carried out among some parents of Highland High School to indicate the percentage of their income they saved in June 2017. The results are shown on the graph below.



1.3.1. Determine the number of people that took part in the survey.

1.3.2. Calculate the number of people who saved less than 20% of their income.

1.3.3. Name the type of graph used to display the information.

2. QUESTION 2

2.1. In South Africa many families solely depend on social grants to sustain their livelihood. Lerato, a 78-year-old grandmother lives with her four grandchildren and takes care of them. Study the information in TABLE 1 below on social grants and answer the questions that follow.

TABLE 1: MONTHLY SOCIAL GRANTS FOR FINANCIAL YEARS 2015/2016 AND 2016/2017 PER INDIVIDUAL

Types of social grants	2015/2016 (in Rand)	2016/2017 (in Rand)
State old age: (60–75 years)	1 415	1 505
State old age: (over 75 years)	1 435	1 525
War Veterans	1 435	…
Disability	1 415	1 505
Foster Care	860	890
Care Dependency	1 415	1 505
Child Support	330	350

[Adapted from *People's guide to the budget*]

2.1.1. Identify the social grant that increased the least over the two financial years.

2.1.2. Two of her four grandchildren received a child support grant.

2.1.3. Calculate the total amount of social grant Lerato and the two grandchildren receive monthly for the 2016/2017 financial year.

2.1.4. 2.3 The War Veterans' social grant was increased by 6.27% at the end of the 2015/2016 financial year. Calculate the monthly amount after the increase to the nearest rand.

3. QUESTION 3

3.1. Kim, a 43-year-old woman took a retirement annuity (RA) policy with an insurance company. The retirement annuity lump sum paid out to the policy holder is taxed by the SARS. In November 2015 she received a RA statement for this policy.

TABLE 1: Extract of retirement annuity statement as at 3 October 2015 for the financial year 2014–2015.

Policy number	7 011 567 723
Policy type	Flexi Pension Pure (No cover)
Investment portfolio	Smoothed Bonus Portfolio
Monthly contribution	R631,94
Maturity value	Minimum: R104 227,00 **to** Maximum: R506 474,00
Maturity date	1st AUGUST 2032
Death benefit	R122 138,71
Premium increases (fixed)	10,00% per annum
Last instalment	1st July 2032
The next statement will be issued on the 3rd of October 2016 for the year 2015–2016.	

3.1.1. Write the abbreviation SARS in full.

3.1.2. Determine the period (in months) that the policy is to run from 1st November 2016 to the maturity date.

3.1.3. Write the maximum maturity value in words.

3.1.4. Calculate the difference between the death benefit amount and the minimum maturity value amount to be received at the maturity date.

3.1.5. Write down the ratio of death benefit to the maximum maturity value in the form 1 : …….

3.1.6. Write down the monthly contribution for the financial year 2014–2015.

3.1.7. Calculate the total annual contribution for the financial period 2013–2014.

4. QUESTION 4

4.1. Lindi received an account from a medical institution. People take out medical aid that deducts a certain amount from their salaries monthly and pays their medical bills. They become members of that medical aid. It does not pay everything and sometimes the patients are asked to pay a certain amount by the medical institution attended.

STATEMENT	**PANADO MEDICAL CENTRE** **PO BOX 6667** **East London, 5201** **Tel: 043-123 6574,**

Mrs Nomsa Lukho Box 2029 Greenfields 5208	**Scale of benefits** Prac. no: 4515652222 Med Aid: Gems Med aid no:000154765	**Balance due** Account no.: Employer:	R499,68 089338 Dept. of Education

Items or values marked with (*) are from a previous month.

Date 2015	**Reference**	**Patient**	**Code**	**Qty**	**Original**	**M/A Portion**	**Member Liab**	**Balance**
5/9	HBEdi*432075 003 Elastocrepe	Nomsa	0201	1	89,80	0,00	24,46*	24,46
20/11	HBEdi*New and established Patient: Consultation Pain Localised to other parts Of abdomen	Lindi	0190	1	309,70	309,70	0,00	334,16
20/11	HBEdi *For emergency consultation	Lindi	0146	1	147,40	108,49	38,91	481,56
20/11	HBEdi*Urine Dipstick, per dipstick	Lindi	4188	1	13,10	13,10	0,00	494,66
20/11	HBEdi* 831832002	Lindi	0201	1	5,02	5,02	0,00	499,68

Only unpaid values are reflected
VAT of ....included **REMITTANCE**

Mrs Nomsa Lukho P.O. Box 2029 Greenfields 5208	Date: 20/11/2015 Dr J Namroo Banking details: Nedbank Corporate Branch Branch code: 195456 Acc. no.: 132 567 4359 Please fax proof of payment
180+ days: 0,00 150 days: 0,00 120 days: 0,00 90 days: 0,00 60 days: 24,46 30 days: 0,00 Current : 475,22 Total due: R499,68	

4.1.1. Name the institution that issued the statement.

4.1.2. Determine the amount in arrears indicated on the statement.

4.1.3. Determine the amount paid by the medical aid for elastocrepe.

4.1.4. Identify the amount the patient is liable to pay for the consultation on the 20 November 2015.

4.1.5. Show how the total amount due was calculated.

4.1.6. Give a reason why Lindi consulted the doctor on 20 November 2015.

4.1.7. Calculate the price of the urine dipstick including Value Added Tax

4.1.8. (VAT). VAT = 14%

4.1.9. Write down the number of months the outstanding amount was due.

5. QUESTION 5

5.1. Springbok and All Blacks match statistics is displayed below:

TABLE 2: Match statistics for All Blacks and Springbok teams

Match statistics		
Teams ⟶	**Springbok**	**All Blacks**
Ball possession	40%	60%
Tackles	116	84

5.1.1. Express the percentage ball possession of the team that has the highest percentage in a simplified common fraction.

MEMORANDUM FOR QUESTION 1

QUESTION 1

1.1

1.1.1 $\frac{750}{3200} \times 100\% = 23.44\%\ Deposit$

1.1.2 $Balance = R3200 - R750 = R2\ 450.00$

1.1.3 $Total\ amount\ paid = R750 + (5\ \times R300) = R2\ 250.00$

1.2

1.2.1 $Time\ to\ clock\ off\ = 7{:}30 + 7\ hours = 14{:}30 + (15\min + 45\min) = 15{:}30$

1.2.2 $Income = R26\ per\ hour\ \times 7\ hours\ \times 5\ days\ \times 4\ weeks = R3\ 640.00$

1.3

1.3.1 $Parents\ in\ the\ survey = 24 + 32 + 16 + 13 + 5 = 90$

1.3.2 $Less\ than\ 20\% = 24 + 32 = 56$

1.3.3 It is a bar graph.

QUESTION 2

2.1

2.1.1 Child Support

2.1.2 2.2 $R1525 + 2\ \times R350 = R1525 + R700 = R2\ 225$

2.1.3 $R1435\ \times 6.27\% = R89.97$

2.1.4 $R1435 + R89.97 = R1\ 524.97 = R1525\ (rounded\ off)$

QUESTION 3

3.1

3.1.1 South African Revenue Services

3.1.2 $15\ year\ as\ 9\ months = 15\ \times 12 + 9 = 189\ months$

3.1.3 Five hundred and six thousand four hundred and seventy-four rand

3.1.4 $R122\ 138.71 - R104\ 227 = R17\ 911.71\ difference$

3.1.5 122 138,71 : 506 474
1 : 4,15

3.1.6 R631,94

3.1.7 $R631.94\ \times \frac{10}{110} = R57.45$

QUESTION 4

4.1

4.1.1 Panado Medical Centre

4.1.2 R24.46

4.1.3 $R89.80 - R24.46 = R65.34$

4.1.4 R38.91

4.1.5 R24,46 +R309,70 + R108,49 +R38,91 +R13,10 + R5,02 = R499,68

4.1.6 Pain located in other parts of the lower abdomen.

4.1.7 $R13.10\ \times \frac{14}{100} = R1.83 + R13.10 = R14.93$

4.1.8 60 Days = 2 Months

QUESTION 5

$\frac{60}{100} = \frac{3}{5}$

EXERCISE 2

QUESTION 1

An American family, Mr. and Mrs. Jones is visiting friends in Johannesburg. Whilst in Johannesburg they get information about the wild coast and decide to book a holiday at Kei mouth in the Eastern Cape Province. At Kei mouth you can take a ferry through the Kei River to Qolora for fishing which is 10 km from the Kei mouth.

Information:

- Hiring costs for a motor vehicle at Avis in East London is R2 800 for the weekend
- Accommodation at one of the resorts in Kei mouth is R543 per night per person sharing (check in Friday, check out Monday)
- Kei mouth ferry – Transports motor vehicles and people across the river at R70 per motor vehicle for a single trip. This service does not operate when the river is in flood.

NB: Distance between East London and Kei mouth is 86 km.

They arrived at the airport at 08:00 and they spend 3 hours and 45 minutes in East London. They travelled to Kei mouth at an average speed of 90 kilometres per hour. Show by using calculations whether they will arrive on time to have lunch at 12:30 at Kei Mouth.

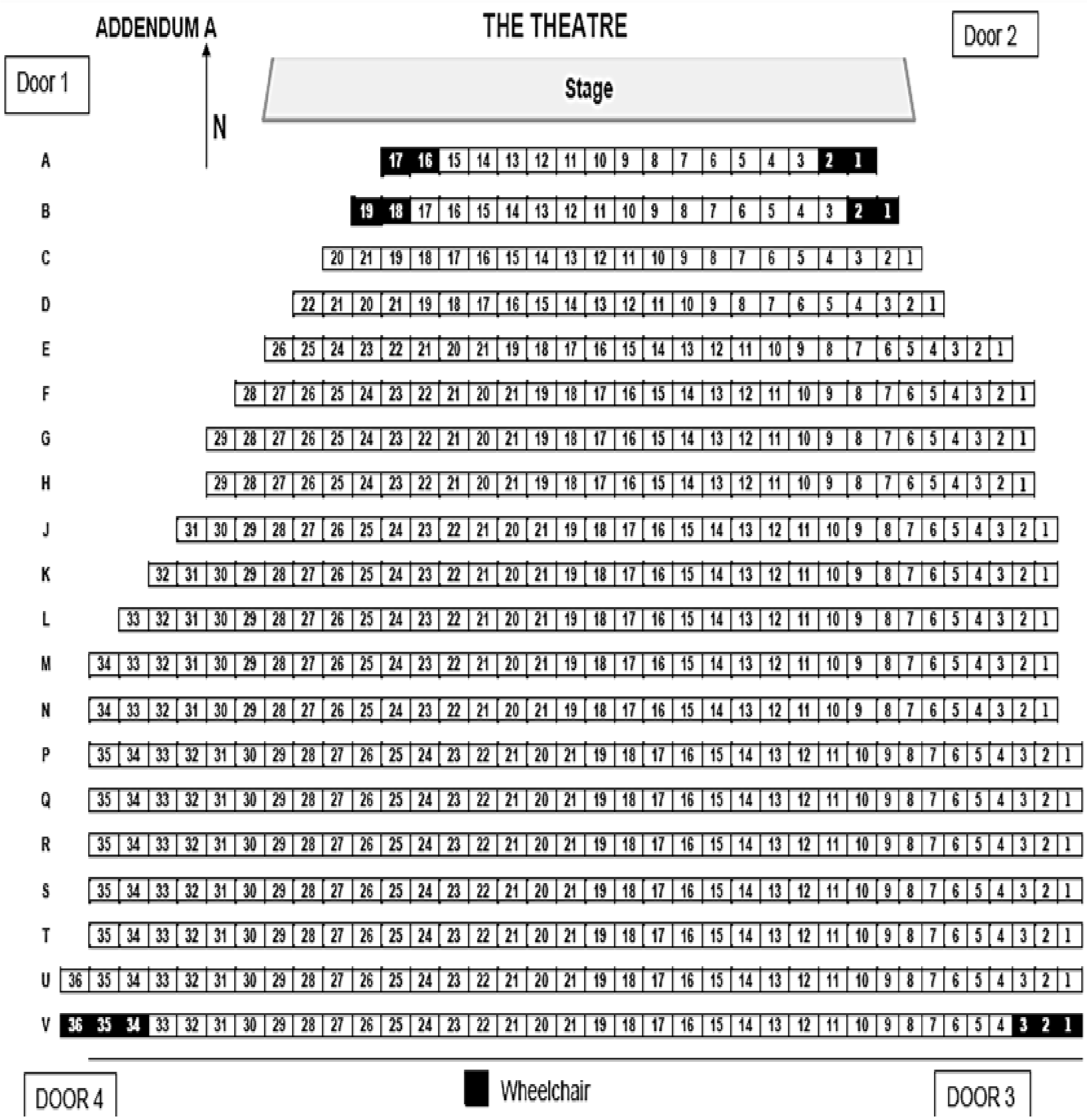
You may use the formula: $Average\ Speed = \frac{distance\ travelled}{time\ taken}$

QUESTION 2

Study the floor plan below to answer the above question.

2.1 On a particular performance, the theatre was $\frac{1}{3}$ full excluding 2 wheelchair seats. Information collected on this day was that the ratio of men to women was 2 : 3. How many men attended on this particular day?

2.2 Yolanda is on holiday in London and wants to book a ticket for a show at the theatre. She is going with a wheelchair bound friend who needs to sit next to her. She wants a chair which is on the left-hand side of the stage when entering through Door 3. Write down all the possible row and chair numbers that she can choose. (She is not selective about the distance from the stage).



QUESTION 3

In 2015 people were employed to develop reading material for schools. They were paid according to the number of pages they developed. Rates and information on remuneration are given below.

They spent 7 days developing the material. They travelled daily to and from the centre where they worked. They worked 10 hours per day.

Remuneration for developing reading material:

Rates for 3 consecutive years			
Year	2013	2014	2015
Norm time (in minutes)	26	26	26
Rate for developing in Rand	147,36	138,25	169,30
Rate for transport in Rand	2,45 per km	2,64 per km	2,82 per km

Notes:

- **Norm time = number of minutes taken to develop 1 page**
- **Total remuneration = amount of developing material + transport**
- **Amount for developing material =**
  $$\frac{\textbf{norm time}}{\textbf{60}} \times \textbf{rate for developing} \times \textbf{number of pages developed}$$
- **Transport fee = rate for transport × number of kilometres travelled**

3.1 One of the employees developed 20 pages in 10 hours. Show, using calculations, whether the employee was within the norm time, or not.

3.2 Calculate the percentage increase in rate of developing material from 2013 to 2015.

3.3 The manager is convinced that the R130 000 that he has budgeted for 10 employees to each develop 161 pages in seven days will be R4 000 more than the amount needed.

Note: Two employees live a distance of 35 km from the centre; three live 25 km from the centre; and the rest live 12 km from the centre.

Verify, showing all necessary calculations, whether the manager's statement is valid.

QUESTION 4

Two friends are travelling from East London to Uitenhage which is a distance of 311 km. They leave East London at 06:00. They stop at Nanaga for 30 minutes for refreshments. If the two friends reach Uitenhage at 08:55, show with calculations whether they did not exceed the average speed limit of 120 kilometres per hour.

You may use the formula: $Speed = \frac{Distance}{Time}$

QUESTION 5

Grade 12 performance of some subjects from 2013 to 2016:

SUBJECTS	2013			2014			2015			2016		
	Wrote	Achieved at 30% and above	% achieved	Wrote	Achieved at 30% and above	% achieved	Wrote	Achieved at 30% and above	% achieved	Wrote	Achieved at 30% and above	% achieved
Geography	239 657	191 834	80,0	236 051	191 966	81,3	303 985	234 209	77,0	302 600	231 588	76,5
History	109 046	94 982	87,1	115 686	99 823	86,3	154 398	129 643	84,0	157 594	132 457	84,0
Life Sciences	301 718	222 374	73,7	284 298	209 783	73,8	348 076	245 164	70,4	347 662	245 070	70,5
Mathematical Literacy	324 097	282 270	87,1	312 054	262 495	84,1	388 845	277 594	71,4	361 865	257 881	71,3
Mathematics	241 509	142 666	59,1	225 458	120 523	53,5	263 903	129 481	49,1	265 810	135 958	51,1
Physical sciences	184 383	124 206	67,4	167 997	103 348	61,5	193 189	113 121	58,6	192 618	119 427	62,0

5.1 Describe the trend of the percentage achieved in Mathematical Literacy from 2013 to 2016.

5.2 Explain how the percentage achieved for Mathematics differ from the percentage achieved for Mathematical Literacy for the period 2013 to 2016.

5.3 In January 2017 when the Minister of Education, Angie Motshekga, announced the 2016 matric results, she mentioned that in 2016 the enrolment for Mathematics increased from 263 903 to 265 810 and that of Mathematical Literacy decreased from 388 845 to 361 865. Write the difference in the Mathematics enrolment to the difference in the Mathematical Literacy enrolment as a ratio.

MEMORANDUM FOR EXERCISE 2

QUESTION 1

Arrival 8:00
Depart at = 8:00 + 3h 45min
=11:45
Time taken at 90km per hour

$$Average\ speed = \frac{Distance\ travelled}{Time}$$

$$90 = \frac{86}{Time}$$

$$Time\ taken = \frac{86}{90} = 0.955555555\ \times 60 = 57.3\ minutes$$

$$Arrival = 11{:}45 + 57.3 = 12{:}42$$

Thus: 12 minutes late

QUESTION 2

2.1 17+19+20+22+26+28+29+30+31+32+33+2(34) + 5(35)+2(36) = 602
No. of people= $\frac{1}{3}$× (602 – 2 wheelchairs) = 200
2 Men + 3 Men = 2 : 3

$$\therefore Men = \frac{200}{5} \times 2 = 80\ men$$

OR

$$Women = \frac{3}{5} \times 200 = 120\ women$$
$$Men = 200 - 120 = 80\ men$$

2.2 Row A15 or Row B17 or Row V33

QUESTION 3

3.1 10 hours = 10 × 60 = 600 minutes
1 page = 26 minutes
600 minutes = $\frac{600}{26}$ = 23 pages
Supposed to develop 23 papers therefore 20 papers are below norm time.

3.2 $\%\ Increase = \frac{2015\,rate - 2013\,rate}{2013\,rate} \times 100$

$$= \frac{169.30 - 147.36}{147.36} \times 100 = 14.89\%$$

3.3 $Amount\ of\ developing\ material = \frac{Norm\ time}{60} \times rate\ for\ developing \times number\ of\ pages$

$$= \frac{26}{60} \times 169.30 \times 161 = 11811.50$$

For 10 employees = 11 811,50 × 10 = 118 114,9667

Km travelled = 35×2×2×7+2×25×3×7+12×2×5×7 = 980 + 1 050 + 840
= 2 870 km

Transport = rate for transport × number of km
Amount = 2 870 × 2,82 = R8 093,40
Total amount = 118 114,9667 + 8093,40 = R 126 208,37
Balance = R130 000 - R 126 208,37 = R 3 791,63

Statement invalid; Balance less than R4 000

QUESTION 4

$$Speed = \frac{Distance}{Time}$$

Time taken = 08:55 – 06:00
= 2 hours 55 minutes
Less time spent in Nanaga
= 2 hrs 55 min – 0 h 30 min
= 2 hrs 25 minutes
= 2,416666…hrs

$$Speed = \frac{311}{2.416666} = 128.69\ km/h$$

They travelled above the speed limit.

QUESTION 5

5.1 Percentage achievement in Mathematical Literacy is decreasing from 2013 to 2016.

5.2 Mathematics decreased from 2013 to 2015
Mathematics increased from 2015 to 2016

5.3 Mathematics = 265 810 – 263 903 = 1 907
Mathematical Literacy = 388 845 – 361 865 = 26 980
Ratio = 1 907 : 26 980

MULTIPLE CHOICE QUESTIONS

1. What is the greatest common factor of 24 and 16?

   A 2

   B 4

   C 8

   D 6

2. What is the greatest common factor of 56 and 49?

   A 2

   B 7

   C 3

   D 4

3. $\frac{1}{10} = ?$

   A 0.01

   B 0.1

   C 1.0

   D 10.0

4. $\frac{12}{100} = ?$

   A 0.012

   B 0.012

   C 1.2

   D 0.12

5. Fifty-two hundredths are the same as …

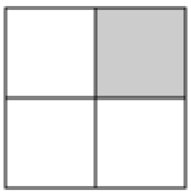
   A 0.52

   B 52.0

   C 5200

   D 5.2

6. What decimal represents the shaded part?



   A 0.20

   B 0.25

   C 0.50

   D 0.75

7. How would you write the fraction $\frac{50}{100}$ as a decimal?

   A 5

   B 0.05

   C 0.5100

   D 0.50

8. Choose the fraction equivalent to the following decimal 0.09.

   A 9/10

   B 90/10

   C 90/100

   D 9/100

9. Put these numbers in order from least to greatest.

   A. 8.75

   B. 8.00

   C. 8.44

   D. 8.04

   A A, C, D, B

   B A, B, D, C

   C B, D, C, A

   D D, B, C, A

10. If 20% of *n* is equal to 40, what is *n*?

    A 200

    B 2000

    C 800

    D 80

11. George bought a car at R5000 and sold it at R5500. What benefit, in percent, did he make?

    A 500%

    B 10%

    C 5000%

    D 5%

12. If 200 students filled the form for entrance test and 180 appeared in the test out of which only 70% have passed the test, then the number of students who failed the test are …

A 68

B 54

C 58

D 65

13. A ratio equivalent to 3 : 7 is:

A 3 : 9

B 6 : 10

C 9 : 21

D 8 : 49

14. The ratio 35 : 84 in simplest form is:

A 5 : 7

B 7 : 12

C 5 : 12

D none of these

15. In a class there are 20 boys and 15 girls. The ratio of boys to girls is:

A 4 : 3

B 3 : 4

C 4 : 5

D none of these

16. Cube root of an odd number is always an …

A even number

B prime number

C odd number

D None of these

17. Identify the perfect cube …

A 100

B 1000

C 10000

D 100000

18. The smallest number by which 81 should be divided to make it a perfect cube is

A 3

B 6

C 9

D 18

19. The cube root of (-63 × -73) is …

A 216

B -42

C 42

D 21

20. If the volume of cube is $4913 cm^3$ then the length of side of the cube is …

A 16 cm

B 17 cm

C 18 cm

D 19 cm

MEMORANDUM OF MATHEMATICAL LITERACY MODULE 1 MULTIPLE CHOICE

1. C
2. B
3. B
4. D
5. A
6. B
7. D
8. D
9. C
10. A
11. B
12. B
13. C
14. C
15. A
16. C
17. B
18. A
19. B
20. B