KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

CURRICULUM GRADE 10 – 12 DIRECTORATE

LEARNER SUPPORT DOCUMENT

GRADE 11

MATHEMATICAL LITERACY

STEP AHEAD PROGRAMME

TERMS 2 & 3

2022

This support document was developed and collated by the provincial KZN Mathematical Literacy Subject Advisors

GRADE 11

Topic: Finance Grade 10 REVISION ON TAXATION (VAT)

VAT is a form of taxation levied by the government on the purchase of goods and the rendering of certain services. This rate is levied at a rate of 15%.

- What does the acronym VAT stand for?
- VAT is the acronym for Value Added Tax. VAT is a form of tax that everybody has to pay when buying goods and services. It is charged as 15% of the price of the goods. The 15% is paid to the provider of the goods and services, and they in turn pay it to the government.
- Explain what is meant when we talk about an item's price being exclusive of VAT
- Explain what is meant by an item being listed as VAT Exempt.
- Certain items, such as basic foods, like milk, bread, fresh fruit and vegetables, maize meal and tinned pilchards are exempt from VAT, which means that they are not taxed. Educational fees, and bus, train and taxi fares are also exempt from VAT.
- VAT is charged at every stage of producing and selling goods. If the person who pays tax is going to use the goods that they buy to make an income, then they can deduct the VAT that they have paid. So the final consumer pays the VAT, while the people along the chain of producing goods and services do not.

TERMINOLOGY

- VAT

Value Added Tax (VAT) is a tax that is levied at 15% (currently in South Africa) on most goods and services, as well as on the importation of goods and services into South Africa.

- VAT exclusive price — The price before VAT is added

Calculating the Price Excluding VAT from the Price Including VAT

To calculate the price excluding VAT from the price including VAT, we multiply the price including by $\frac{100}{115}$. We want the excluding which is 100% so it must be the numerator and we have the Including which is 115% so it must be in the denominator.

Formulae: Price Including VAT x $\frac{100}{115}$ = Price Excluding VAT

- VAT inclusive price — The price after VAT is added.

Calculating the Price Including VAT from the Price Excluding VAT

To calculate the price incl. VAT from the price excl. VAT, we multiply the price excl. by $\frac{115}{100}$. This figure is arrived at by adding the 100% for the value of the goods to the 15% for VAT giving 115%. In the fraction the numerator is always what you want and the denominator is what you have to give a fraction of $\frac{115}{100}$.

Formulae: Price Excluding VAT x $\frac{115}{100}$ = Price Including VAT.

- Zero rated VAT items — These are goods that are exempt from VAT. Groceries that are basic foodstuffs are zero-rated in South Africa, e.g. brown bread, milk, mielie meal, samp, rice, etc..

Topic :Finance

Section: **UIF (ABBR.) UNEMPLOYMENT INSURANCE FUND**

TERMINOLOGY

UIF (abbr.)	Unemployment Insurance Fund: A government-run insurance fund which employers and employees contribute to, so that when employees are retrenched they can collect some earnings (a portion).
Commission	The sum of money paid to an agent (usually a salesperson) that is a percentage of the total value of goods sold by the agent
Gross income	The total amount of all an individual's income before deductions.
Net pay	The amount an employee "takes home" after income tax has been deducted.
Salary	An amount of money paid for the work you do. (This is normally paid monthly.)
Wages	A wage is an amount of money paid to an employee normally based on a fixed number of hours worked per week.

Understanding UIF

- UIF stands for Unemployment Insurance Fund
- UIF is an insurance that is deducted from an employee"s salary or wages in case the employee loses his/her job. If this happens, then the employee can claim an allowance from the Unemployment Insurance Fund for a certain period or until they find another job.

Calculation UIF

- The amount of money that must be deducted from an employee"s salary or wages is calculated as a percentage of their gross salary → i.e. 1% of gross salary.
- The employer must also contribute a further 1% to the fund on behalf of each employee. So employers must pay a total contribution of 2% of each worker"s pay per month to the unemployment insurance fund (UIF).

Notes

A government-run insurance fund which employers and employees contribute to, so that when employees are retrenched they can collect some earnings (a portion).

The content of this section on Taxation, as part of the Finance Application Topic, is drawn from page 58 in the CAPS document.

Consider the manager who earns a gross salary of R11 543,00 per month. Amount to be deducted from the employee"s salary = 1% × gross salary

= 1% × R11 543,00

= R115,43

This is the amount that the employee will have to pay. The employer will also have to match this amount and pay an additional R115,43.

So the total amount paid to the Unemployment Insurance Fund on behalf of this employee is R230.86

CEILLING SALARY

TOPIC:	FINANCE - SECTION: EXCHANGE RATES

TERMINOLOGY

Equivalent	Quantities that have the same value.
Estimate	Roughly work out; roughly calculate.
Exchange rate	The value of one currency relative to the value of another currency.
Currency	A system of money in general use in a particular country

Notes

The content of this section on Exchange Rates, as part of the Finance Application Topic, is drawn from page 60 in the CAPS document.

INTEGRATED CONTENT

In working with exchange rates, learners will be required to draw on their knowledge of rates and proportion from the Basic Skills Topic of Numbers and calculations with numbers.

WORKING WITH EXCHANGE RATE VALUES

A currency conversion involves converting a certain amount of one type of currency into another type of currency. The exchange rate between the two currencies gives an indication of how this conversion should take place.

There are two ways of converting currencies.

- Estimation
- Accurate calculation

Currency conversion using estimate

Estimating currency conversions is the method commonly employed by many people who travel to different countries. They only need a general idea of the amount of currency that will be exchanged.

EXAMPLE

Consider a person who wants to exchange R2 000, 00 into American Dollars ($) at an exchange rate of R15, 16: $1, 00.This exchange rate tells us that approximately R15, 16 is needed for $1, 00.

So: R1000 will give ≈ $65,97 → R2000,00 will give ≈ $131,95

So, R1 000, 00 will give approximately $65 97, 00.

Importantly, since the exchange rate is just less than R16, 00 for $1, 00, we might need to readjust this estimate slightly in our own heads to understand that R1 000, 00 will give us just more than $65, 00.

Currency conversion require accuracy

However, if a person is running a business where they import or export goods into / out of the country, then they may need to be able to perform currency conversions accurately since this will impact on precisely how much they will have to pay or charge for the goods.

Topic: Finance Section: Tariffs

TERMINOLOGY

Incremental	Relating to or denoting an increase or addition, especially one of a series on a fixed scale.
Tariff	The rate charged for a service rendered, e.g. import duties, water consumption cost, etc.
Break-even point	Break-even point is where the business is at an activity level (doing business) at which total cost = total sales, i.e. you have made enough income to cover the costs. At the break-even point, you are making neither a profit nor a loss; from that point on you will be making a profit with each sale (until new costs are incurred).

Methodology

The content of this section on Tariff systems, as part of the Finance Application Topic, is drawn from page 50 in the CAPS document

Municipal (water tariffs)

Water tariff systems are an example of an „incremental" tariff system.

This means that different portions of a quantity of water used are charged at different rates rather than the whole quantity being charged at the same rate.

Example

The following table of water tariffs for Johannesburg

TABLE 2: Normal water tariff charges for Johannesburg in 2020/2021

Tariff Summary (in kilolitre) 	Tariff Rand per kilolitre (without VAT) Normal	Tariff Rand per kilolitre (without VAT) With Restrictions
0 – 6 kℓ	Free	R 7,14
7 – 10 kℓ	R7,14	R 12,07
11 – 15 kℓ	R12,07	R17,65
16 – 20 kℓ	R17,65	R24,03
21 – 30 kℓ	R24,03	R25,81
31 – 40 kℓ	R25,81	R32,27
> than 40	R32,27	R44,00
[Source: *www.johannesburgwater.co.za*]		Conversion: 1 kℓ = 1 000 litres

The following method is used to determine the cost of using 25 litres of water:

- Cost of using first 6 ℓ = R0,00
- Cost of using next 4 ℓ (from 6 to 10 ℓ) = R7, 14/ℓ × 4,5 ℓ = R28,56
- Cost of using next 5 ℓ (from 10 to 15 ℓ) = R12,07/ℓ × 9,5 ℓ = R60,35
- Cost of using the last 5 ℓ (from 16 to 20 ℓ) = R17,65/ℓ × 5 ℓ = R88,25
- Cost of using the last 5 ℓ (from 21to 25 ℓ) = R24,03/ℓ × 5 ℓ = R120,15

Total cost of using 25 ℓ = R0,00 (6 ℓ) + R28,56 (4,5 ℓ) + R60,35 (9,5 ℓ) + R88,25 (5 ℓ) + R120.15 = R297,31

EXAMPLE Use the above table to answer the following questions.

1. The family in Johannesburg consumes 750kWh in the mount of November 2021. Calculate the cost in prepaid system.

Solution

Electricity consumption = 750kWh

Electricity tariff = 78.52/kWh (R0.7852 per every whole unit of electricity)

Monthly cost = R0, 7852 x 750kWh = R588.90

2. Use the example to calculate the monthly cost of using the following amounts of electricity on a pre-paid system during the month:
   - i. 500kWh
   - ii. 1472kWh
   - iii. 2817,3kWh

Solution

i. Cost = R0,7852/kWh X 500kWh = R431, 86

ii. Cost = R0, 7852/kWh X 1472kWh = R1 155, 81

iii. Cost = R07852/kWh X 2827,3kWh = R 2 220,55

The example below shows the cost of non-prepaid system.

Electricity system: Domestic 3Ø– 60A

Electricity consumption = 750kWh

Fixed charge = R198,03

Network charge = R62,70

Consumption charge = R47, 38 (R0.4738 per every unit of electricity)

Cost = R198, 03 + R62, 70 +(R0.4738/kWh X 750kWh)

=R198,03 + R62, 70 + R355, 35

= R616.06

ACTIVITY

The Mngeni Municipality is under new administration, the bi-lows has change for the better, below is the tariff structure show to charge electricity for the residential customers. Study the tariff structure below and answer the questions that follow.

Municipality billing structure as from 1 July 2020 to 1 July 2021

Electricity usage in Kwh	Tariff per kwh
0 kwh to 50 kwh	85,45 cents per kwh
51 kwh to 350 kwh	109,10 cents per kwh
351 kwh to 600 kwh	153,05 cents per kwh
Above 600 kwh	159,80 cents per kwh
Source Mngeni Municipality	

1.1 Define the term tariff. (2)

The table below shows the Tourist Class fares from Johannesburg to Durban vice versa.

Johannesburg to Durban			Durban to Johannesburg		
Days Running	**Friday and Sunday**		**Days Running**	**Friday and Sunday**	
Train Station	**Arrive**	**Depart.**	**Train Station**	**Arrive**	**Depart.**
Johannesburg to ...		17:30 Day 1	**Durban to ...**		19:15 Day 1
Germanton (R120)	18:23 Day 1	18:43 Day 1	Pietermaritzburg (R140)	21:44 Day 1	22:04 Day 1
Standerton (R160)	21:42 Day 1	22:07 Day 1	Estcourt (R180)	00:38 Day 2	00:48 Day 2
Newcastle (R210)	00:58 Day 2	01:23 Day 2	Ladysmith (R200)	03:14 Day 2	03:34 Day 2
Ladysmith (R260)	03:41 Day 2	04:06 Day 2	Newcastle (R250)	05:56 Day 2	06:16 Day 2
Estcourt (R280)	05:17 Day 2	05:37 Day 2	Standerton (R300)	08:47 Day 2	09:07 Day 2
Pietermaritzburg (R320)	08:21 Day 2	08:51 Day 2	Germanton (R350)	11:38 Day 2	11:58 Day 2
Durban (R360)	11:59 Day 2		**Johannesburg** (R360)	12:36 Day 2	
Month	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**
Fares	R360	R360	R360	R360	NOY

*Fares are quoted per adult, single fare, one-way journey.
*Kids (ages 3 – 9) pay 80% and kids (ages 0 -2) travel for free.
*Senior citizens (age 55+, holders of SA I.D) are given 25% discount on Tourist Class trains only.
*Peak season fares effective from the beginning of December to the end of January.
*Allowance is made for 25kg luggage p/adult fare paid. Extra luggage is charged at R5/kg or part thereof.
*All fares and charges are inclusive of 15% VAT.

1.1 The family is planning to board on the 24th of January 2022 to Newcastle to visit some relatives, verify how much will it cost to travelling to Newcastle for the whole family. (8)

1.2 Mr. Zwane is owning 2.0 VW Combi, he claims that he would have spent less if he use his car for the trip to Newcastle, one full tank of petrol would cost R1 450.00. Verify with calculations if the statement is correct. (7)

1.3 The Family board the train on the 27th of January from Newcastle to Johannesburg their destination. How many days will it take them to arrive at Johannesburg? (2)

1.4 Mr. Zwane predict that he will spend less than R600.00 for the whole family when traveling from Newcastle to Johannesburg. Verify if his prediction is correct. (6)

2.1 The family in question above will take an Uber, which carries a maximum of 6 passengers, from train station to Roodeprt the, a distance of 14, 6 km.

TOPIC FINANCE - SECTION: BANKING FEES:

TERMINOLOGY

Account	A record of income and expenditure.
Balance	This is the difference between debits and credits.
Bank statement	The details of all the transactions made from one bank account in a given time period.
Credit	This is an entry in an account that shows a payment made into the account.
Credit balance	The amount in the account is your own.
Disposable income	Income that is left over after all payments have been made
Fixed expenses	These are amounts that must be paid every month and which stay the same, like rent, school fees and transport costs.
Loan	A loan is an agreed sum of money that is lent by a bank or moneylender (e.g. personal loan or home loan).

Methodology

We use different bank fee formulae to compare bank charges on different types of transactions.

- To make sense of graphs drawn to represent different types of bank charges.
- To make decisions regarding the cost of different types of transactions at different banks.

Three different types/structures of bank fee formula.

i. Fixed cost plus additional cost that is a % of the transection

ii. Same as (i) but with maximum fee stated.

iii. Variable fee that is charged per R100, 00 of the transaction

	Fee charged	Method	Example
Fixed cost plus additional cost that is a % of the transection	Fee = R3,90 + 1.15% of deposit value	1.15% transection value is calculated and added to a fixed cost of R3,90	Fee of R800 deposited = R3,90 + 1.15%of 800 = R3,90 + R9,20 = R13, 10
Fixed cost plus additional cost, but with a maximum fee stated	Fee = R3,75 + 0,75% of payment value (with maximum fee of R17,00)	0, 75% of the transaction value is calculated and added to a fixed cost of R3, 90. Check solution to see if is less or higher than R17, 00, if the fee is more than maximum fee, replace by maximum.	Fee of R20 000.00 pay = R3,75 + 0,75% of R20 000 = R3,75 + R150,00 R153, 75. The amount is higher than the maximum fee of R17.00, so maximum must be charged.
Variable fee that is charged per R100, 00 of the transaction	Fee = R105.00 per R100, 00	Work out how many Hundreds (R100.00) make up the transaction value and multiply by R105.00	Fee of R3350.00 is deposited. 34 full hundreds = R105.00 X 24 = R35, 70

ACTIVITY 1

Mr James bank want to change her bank then she obtains the following bank charges rate table from the nearest standard Bank. Study the table and answer the questions that follows:

TOPIC: MAPS, PLANS AND OTHER REPRESENTATION OF THE PHYSICAL WORLD
SECTION: SCALES AND MAPS (TERM 2 WEEK 3)

TERMINOLOGY:

Scale Determines how many times smaller an object shown on a plan or map is that its actual size

Bar scales Presented as a picture, it means that if you placed a ruler next to this scale, you could determine how many centimetres next to this scale, you could determine how many centimetres represent the specified kilometres

Number scale A number scale such as 1: 50 000 means that 1 unit on the map represent 50 000 units in real life

Scale drawing A diagram of a real-life object drawn in proportion.

NOTES

NOTES: The number scale is expressed as a ratio like 1: 50. This says that 1 unit on the map represents 50units on the ground. For example, 1 cm on the map will represent 50 cm on the ground and 1 m on the map will represent 50 m on the ground.

To use the number scale, you need to measure a distance on a map using your ruler or use the distance provided, and then multiply that measurement by the "real" part of the scale ratio given on the map, in order to get the real distance.

Scale is used to Proportionally Increase or Decrease the Size of an object or a place.

A scale drawing has exactly the same shape as the object or place, but is drawn to a smaller size or bigger size.

A) Benefits of using scale:-
- We can see the whole object in one diagram
- We can calculate dimensions from measurements
- We can calculate costs more accurately

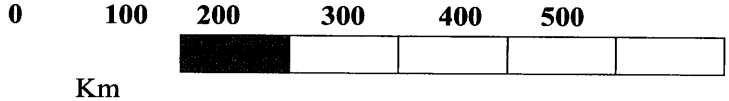
B) Types of Scale

1. NUMBER SCALE/ ratio scale
   - This Scale is written as a Ratio of the measurement of DRAWING: ACTUAL or MAP: REALITY
   - The unit of measurement are the same
     e.g 1:100
     this means that for every 1 unit on the map is equals to 100 units in reality.

Advantages and Disadvantages of number scale

Advantage	Disadvantage
They are more convenient when working with a very small scale	The scale is affected by printing and become inaccurate. It is only relevant for the original map.

2. **BAR SCALE (linear scale)**



- This Scale is given as a picture. The measurement between the spaces on the scale will equal to the actual distance.
- In the example above we measure the distance between the lines of the scale which is 1cm and the scale reads that the measurement will equal 100km in Actual measurement giving us the Number Scale 1cm : 100Km
- We can now convert between the measurements using the methods we learn in Ratios.

3.2 cm = actual
5 ×actual = 3.2×10km
5 ×actual = 32 km (divide by 5 both sides)
Actual = 6.4 km

ACTIVITY

Question 1.

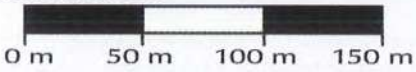
Write these bar scales as numeric/ratio scales

1.1.1 3

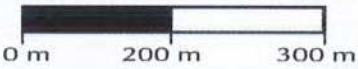
1.1.2 2

Question 2

2.1 You are given the following bar scale and you measure a distance of 15cm on a map. What is the actual distance? (3)

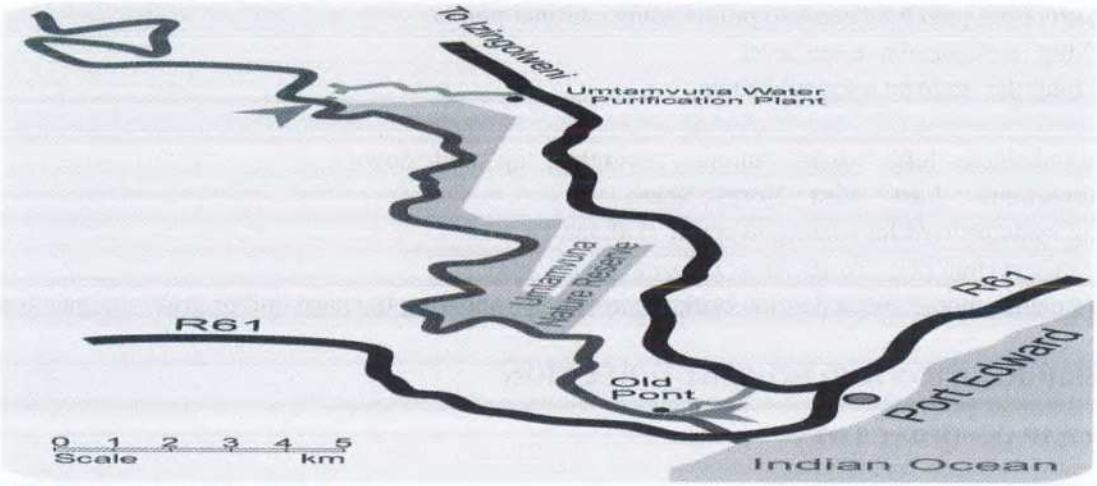


2.2 You are given the following bar scale and a measured distance of 11 cm between two points on a map. What is the distance on the ground? (3)



Question 3

Study the map below and answer the following questions.

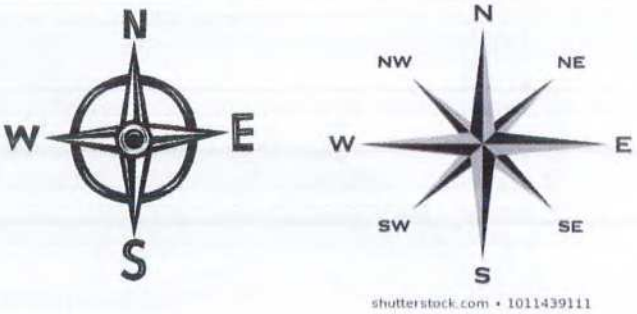


Source: https://www.google.com/url

3.1 What type of scale used in the map? (2)

3.2 Mention ONE advantage of using scale mention in 3.1. (2)

3.3 Use the given scale to calculate the actual distance between Umtamvuna Water purification plant and Old Pont. (3)



Compass direction can be used to indicate exact direction. Compass directions and the map should always go hand-in –hand. We need the compass since our Earth is divided into 4 cardinal points known as **NORTH, EAST, WEST** and **SOUTH**. Also to further simplify our search, these points are divided into North East, South East, North West and South West as shown below:

2. GENERAL DIRECTION

You can give direction using words like: left, /right and up/down

GRID REFERENCE

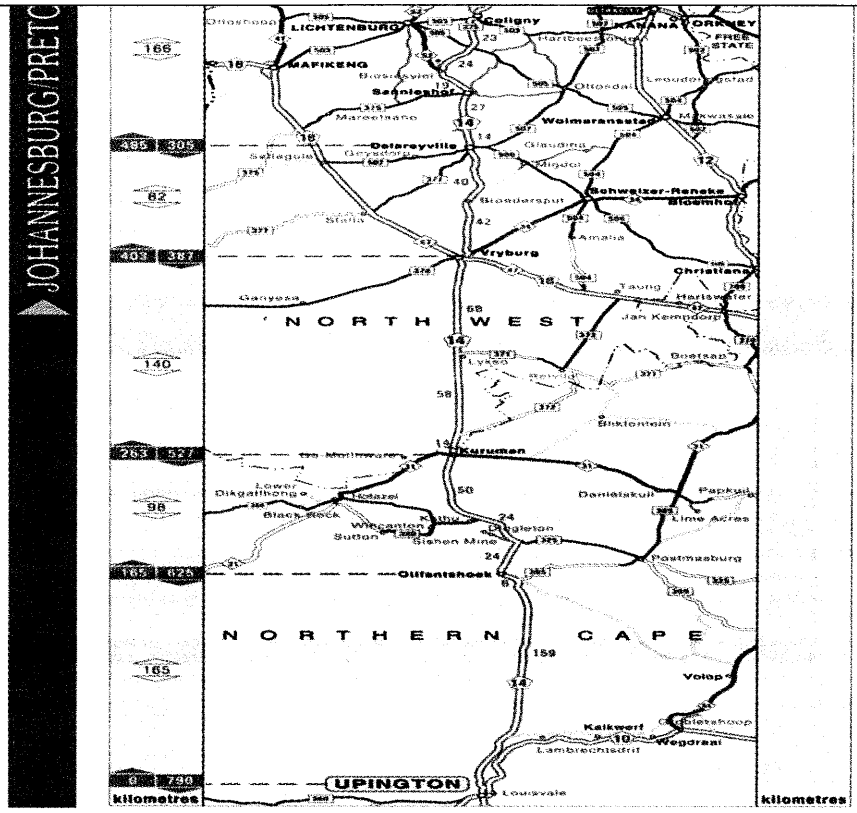
- Grid Maps have horizontal and vertical lines, forming blocks.
- One set of lines are labelled using Alphabet and the other set is labelled using numbers.
- Hence each block now has a Grid Reference being the Alphabet followed by the number. (alphanumerical system)

Grids make it easier and quick to find what we are expected to locate in a map. They also describe the relative position of a location. The grid reference is the intersection of a column and a row at the exact point of contact e.g. C4. It's highly appropriate that when mentioning a grid reference, you start by the letter followed by a number e.g. C4

TYPES OF MAPS

NATIONAL MAP= Shows demarcation of provinces, national roads and regional roads

Elevation Map



https://www.google.com/search?q=Route+elevation+map&sa

1. Describe directions to get from Lichtenburg to Bloemhof.
2. How long would this journey take if the car's average speed is:
   2.1. 90 km/h
   2.2. 110 km/h?
3. If the car consumes 10,5 litres of petrol per 100 km at these speeds, and the cost of petrol is R13,20 per petrol, what will the petrol cost for this trip?

Solution

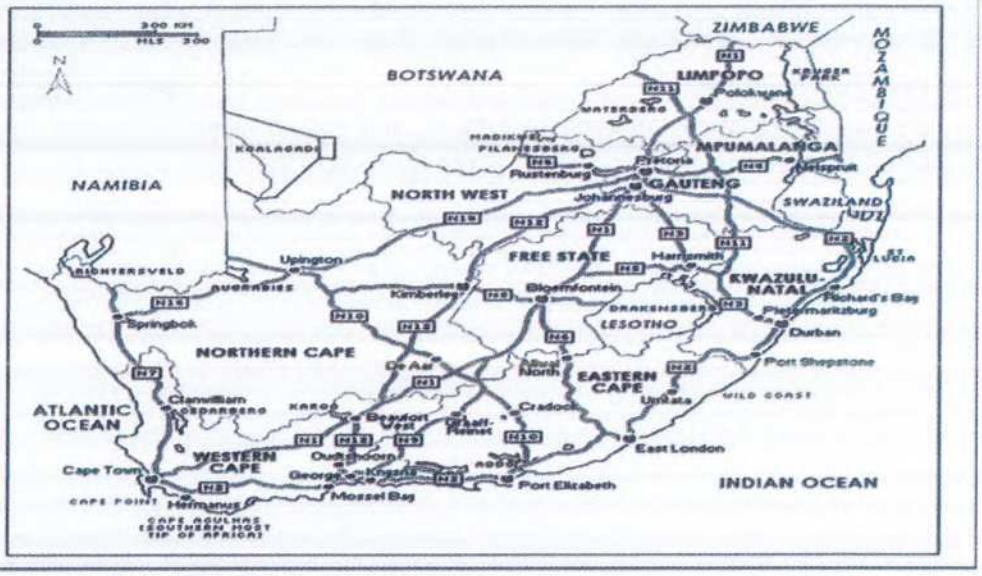
1. From Lichtenburg, travel along the R52. Get onto the N14 highway and travel 60 km. Then take the R506 off-ramp to Schweizer-Reineke. In Schweizer-Reinecke, turn left to get onto the R34, which takes you to Bloemhof.
2. The total distance is approximately 170 km

1.1. $time = \frac{distance}{speed}$ $= \frac{170km}{90km/h}$ $= 1{,}89h$ $= 1h53min$	2.2. $time = \frac{distance}{speed}$ $= \frac{170km}{110km/h}$ $= 1{,}89h$ $= 1h53min$ $= 1.55\ h$ $= 1\ h\ 33\ min$

3 the cost of the petrol $= 10{,}5 : 100$

$x : 170$

$x = \frac{10{,}5 \times 170}{100}$



https://www.google.com/search?q=Route+elevation+map&sa

2.1 Give the name of the national road that John and his family will use from Port Elizabeth to Port Shepstone. (2)

2.2 Which ocean is on the west of Port Elizabeth? (2)

2.3 How many national roads connects to Bloemfontein? (2)

2.4 Name TWO towns which they will pass when travelling from Port Elizabeth to Port Shepstone. (2)

2.5 State the general direction of Lesotho from Western Cape. (2)

2.6 Write down ONE advantage of using a bar scale (2)

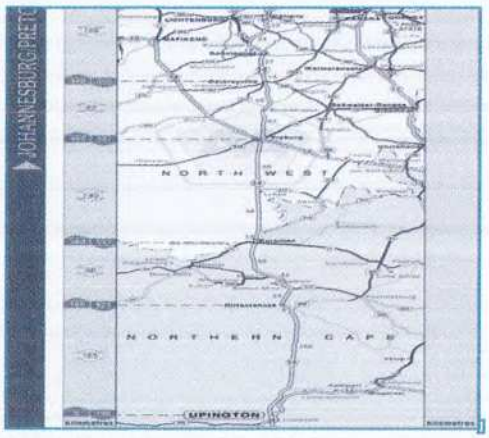
2.7 The distance that John Travelled to his Uncle's place is measured as approximately 7cm on the map. Use the bar scale to determine the estimated distance in kilometres that John travelled. (4)

2.8 John drives at an average speed of 110km/h. Use the estimated distance calculated in 1.7 above to determine the time (rounded off to the nearest hour) it takes to travel from Port Elizabeth to Port Shepstone. (3)

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

Question 3

Use the strip map of an area of the North West and Northern Cape province to answer the following questions.



https://www.google.com/search?q=Route+elevation+map&sa

3.1 Calculate the distance from Delereyville to Olifantshoek 2

Topic: DATA HANDLING GRADE11LEARNER DOCUMENT

SECTION: DATA CYCLE, DATA COLLECTION AND METHODS

TERMINOLOGY

1. Interviewee- the person responding to the questions during an interview.
2. Interviewer- the person asking questions during an interview.
3. Survey-a statistical study that collect data to see trends or to form some type of conclusion, it is
4. Unbiased- fair, unprejudiced and neutral.
5. Observation- information is gathered or obtained through observing the activates/events or circumstances.
6. Questionnaire- A list of questions are posed to the participant to answer, in the form of a questionnaire. The questions can be sent to the person to respond immediately or later.
7. Data- It is raw information that has been collected, through the various data collection methods.
8. Categorical data -refers to data that is presented according to categories only, e.g. colour, make or location
9. Discrete data - is data that can be counted or countable data. It consists of whole numbers (the test scores that learners got in a test)
10. Continuous data - is measured data and may contain decimal fractions.
11. Tally mark - is a way of recording using the short vertical lines grouped in 5's where the four lines are vertical and the fifth one is struck on the first 4, each line represents a response and it makes easy to record
12. Frequency - is the number of times an event is observed
13. Frequency table - is a table used to summarise the data that was gathered from the survey and reflecting number of times the events have occurred or found during the gathering of the information.
14. Data cycle – Consists of at least six inter-connected stages, i.e. Posing a question(s), Collecting data, Classifying and Organizing data, Summarizing data, Representing data (Graphing) and Interpreting/Analysing the data.
15. Population – Refers to the entire source of data as a whole that is involved in a study. Sample - Subset (small group) chosen from the population to represent the population.

NOTES

Data Cycle

Every statistical process consists of at least six inter-connected stages:

1. Posing a question(s)
2. Collecting data
3. Classifying and Organizing data
4. Summarizing data
5. Representing data (Graphing)
6. Interpreting/Analysing

Solution

1.1 Posing the questions

1.2. Collection of the data

1.3. Interpreting/Analysis of the data

EXAMPLES

SURVEY ABOUT THE CONDITION UNDER WHICH LEARNERS DO HOMEWORK

Name of respondent:	Tick Yes or No	
About the place where you do your homework		
1. Is the learning space well lit?	Yes	No
2. Are you in a room on your own?	Yes	No
3. Do you work at a table or desk?	Yes	No
While you do your homework		
4. Do you listen to the radio?	Yes	No
5. Do you listen to recorded music?	Yes	No
6. Do you watch Television?	Yes	No

1.1 State whether the following data sets are categorical, discrete, or continuous.

1.1.1 The mass of newborn babies born in one hospital on the one day. **(2)**

1.1.2 The number of multiple-choice questions Thabo got correct. **(2)**

1.1.3 The type of transport that grade 11 learners take to school. **(2)**

SECTION: CLASSIFYING AND ORGAINISING DATA

Below is the results of grade 11 learners at Cool Air Secondary

50 68 84 39 47 55 20 45 53 29 85 60 75 41 18
35 48 52 68 75 91 75 54 66 53 59 68 75 62 65

Use the above given information to complete a frequency table

Level	Interval	Tally	Frequency
1	0-29	///	3
2	30-39	//	2
3	40-49	////	4
4	50-59	~~////~~ //	7
5	60-69	~~////~~ //	7
6	70-79	////	4
7	80-100	///	3
		Total	30

Activity

Below is the results of grade 11 learners at Heather Secondary School

40 58 74 29 37 45 10 35 43 19
95 70 85 51 28 45 58 62 78 85
92 74 52 65 54 58 69 74 63 64
65 68 75 88 89 85 63 81 62 68

Use the above given information to complete a frequency table

Level	Interval	Tally	Frequency
1	0-29		
2	30-39		
3	40-49		
4	50-59		
5	60-69		
6	70-79		
7	80-100		
		Total	

1.1.3 $\frac{15}{100} \times 120\ learners = 18\ learners$

1.1.4 1.1.2 20:40

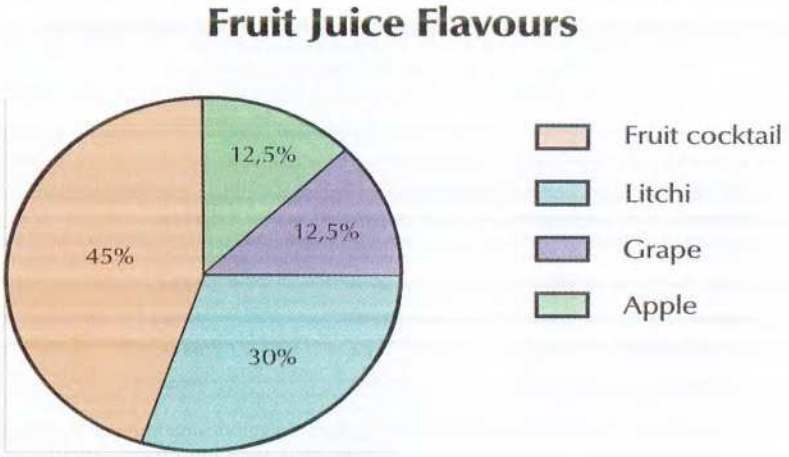
1 : 2

1.1.5 $\frac{10}{100} \times 120 = 12\ learners$

LEARNER ACTIVITY

Question 1

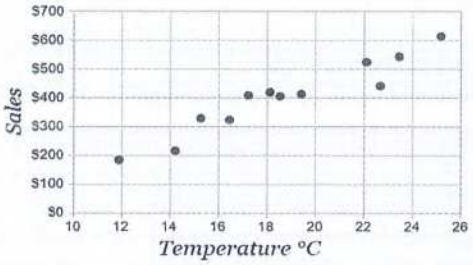
1.1 The pie chart below shows the favorite fruit flavors of a group of 240 learners.



1.1.1	Calculate how many learners chose apple juice.	(2)
1.1.2	Identify the juice flavor(s) that is liked by the least number of learners	(2)
1.1.3	Calculate the range percentage of juice flavors.	(2)
1.1.4	Which juice should the seller buy most and why?	(3)
1.1.5	How many learners like litchi juice?	(2)

2.2. The owner of an ice cream shop is interested in how the weather effects his daily income. The given table shows the daily temperature in conjunction with the sales made on that day.
Use the table to draw a scatterplot diagram

Ice Cream Sales vs Temperature	
Temperature °C	Ice Cream Sales
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408



2.2 Are there any clear trends visible on the graph you have drawn? (2)

Solution

Yes, the ice cream sales increase when the weather gets warmer

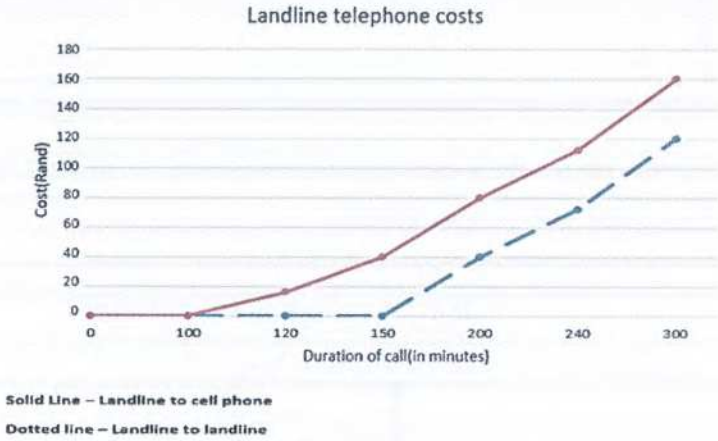
QUESTION 3

The table below, shows Mund's landline call costs.

Duration of call(in minutes)	0	100	120	150	200	240	A
Cost of landline to landline(in Rand)	0	0	0	0	40	B	120
Cost of landline to cell phone (in Rand)	0	0	16	C	80	112	160

3.1 Determine the values of A, B and C.

3.2 Use the completed table to draw a suitable graph to compare the landline to landline, and landline to cell phone costs



Solution

$A = R120 \div R0{,}80 = 150min + 150free\ min = 300mim$

$B = (240 - 150)min \times R0{,}80 = R72$

$(120 - 100)free\ minutes = 20\ min(not\ free)$

$R16 \div 20min = R0{,}80\ per\ min$

2.1	Which province(s) had a decrease from 2002 to 2003 in the percentage of drivers exceeding the alcohol limit?	(2)
2.2	What % of drivers exceeded the alcohol limit in the Eastern Cape (EC) in 2002?	(2)
2.3	Which province had the highest percentage of drivers exceeding the alcohol limit in 2003?	(2)
2.4	The number of drivers tested in the Western Cape (WC) during 2003 was 124 800.How many of these drivers exceeded the alcohol limit?	(2)
2.5	The number of drivers in Limpopo who exceeded the alcohol limit in 2002 was 1132. How many drivers in Limpopo were tested?	(2)
2.6	Give one possible reasons for the decrease from 2002 to 2003 in drivers exceeding the alcohol limit from Gauteng.	(2)

2.1 CALCULATE

I. The mean

II. The mode

III. The median

IV. The range

V. What is the probability if a school is selected at random that it will have a score of 68?

Solution

I. $\text{Mean} = \frac{67\times1+68\times4+69\times3+70\times1+71\times1}{10}$

$= \frac{687}{10}$

$= 68{,}7$

II. Highest frequency is 4. Therefore, the mode is 68

III. Even number of data is 10 so the 5^{th} and 6^{th} data value

67 68 68 68 68 69 69 69 70 71

Therefore, the media $= \frac{68+69}{2}$

$= 68{,}5$

IV. $\text{Range} = 71 - 67$

$= 4$

V. $P(68) = \frac{4}{10}$

$= \frac{2}{5}$

ACTIVITY - QUESTION

Dumi is studying her budget for the past two months, as she has kept track of the money she spent on groceries each week. The amounts are shown in the following table.

Month	1				2			
Week	1	2	3	4	5	6	7	8
Amount spent	R112	R120	R116	R152	R114	R118	R123	R140

1.1 What is the median amount of money spent? (3)

1.2 What is the mean amount of money spent? (3)

1.3 What is the probability that she spent more than R130 on a week picked at random? (3)

The body mass (in kg) for each member of the U-16 rugby team is recorded below.

45 53 51 56 49 53 56 44 53 42 53

43 60 45 50

2.1 Arrange the data in ascending order.

2.2 Determine the following: (2)

2.2 a The range of the body mass. (2)

2.2 b The mode of the body mass. (2)

2.2 c The median body mass. (2)

2.3 Calculate the mean body mass of the under - 16 team, rounded off to the nearest kg. (3)

TOPIC PROBABILITY

Term	TWO	**Week**	8-9	**Grade**	11
Duration	3 HOURS				
Section	TWO WAY TABLE and TREE DIAGRAM				

OBJECTIVES

By the end of the lesson, the learners should be able to:

- Know the difference between the term event and outcome or result.
- Know that probability is expressed using a scale that ranges between 0 (Events that cannot take place- **Impossible events**) and 1 or 100% (Events that are **certain** to take place).
- Know that the probability of an event is expressed using FRACTIONS, PERCENTAGES AND DECIMALS NOTATIONS.
- Represent possible outcomes for compounds events by making use of
  - Tree diagram
  - Two -way tables.
- Explore probability in scenarios involving.
  - Games using coin and dice.
  - Weather predictions.
- Tests where there is the chance of inaccurate results.
- Cosmetic and other products making statements regarding probability.
- Newspaper articles containing references to probability.

RELATED CONCEPTS/ TERMS/ VOCABULARY

- Probability- use symbol **P** to indicate the probability of an event, with outcome written in brackets
- Events
- Outcomes/ results
- Simple events
- Compound event
- Relative frequency
- Theoretical Probability
- Tree diagrams
- Two- way tables

PRIOR KNOWLEDGE/ BACKGROUND KNOWLEDGE

In grade 10 learners:

- Explore probability in scenarios involving
- Games using coins and dice.
- Weather predictions
- Tests where there is a chance of inaccurate results
- Cosmetic and other products making statements regarding probability

RESOURCES

Textbooks, coins and dice.

JIT and STEP AHEAD Documents, Previous question papers,

Two- way table (also known as a contingency table) works in a similar way to a tree diagram but the outcomes of one event are in rows and the other outcomes of the other events are in columns.

	H	**T**
H	H;H	H;T
T	T;H	T;T

EXAMPLES

1. Express the following probabilities as a fraction, a decimal and a percentage.

1.1 What is the probability that Joshua was a first born in a family with seven children?

1.2 What is the probability of rolling a multiple of 2 when rolling a single normal dice?

1.3 What is the probability of raining today if it is currently raining outside?

1.4 What is the probability of getting a tail if a single coin is being tossed?

1.5 What is the probability of getting a cat as a learner in your school?

SOLUTIONS

1.1 Fraction $=\frac{1}{7}$; decimal= 0.143; percentage: $\frac{1}{7} \times 100 = 14.29\%$

1.2 Fraction: $\frac{2}{6} = \frac{1}{3}$; decimal = 0.33; percentage : $\frac{2}{6} \times 100 = 33.33\%$

1.3 Fraction =1; decimal:1.00; percentage: =100%

1.4 Fraction $= \frac{1}{2}$; decimal = 0.5; percentage: $\frac{1}{2} \times 100 = 50\%$

1.5 Fraction= 0; decimal= 0.0; percentage: 0%

Example 2

2. Write down on a probability scale where each of the following events can be expressed.

2.1 You win a prize in raffle after buying 75 of the 100 tickets.

2.2 You win a lottery after buying 25 lottery tickets.

2.3 Rain falling in summer season in a particular day.

2.4 If today is Friday, tomorrow is Sunday.

2.5 Red is a colour.

SOLUTIONS

2.1 75% or more likely.

2.2 25% or less likely.

2.3 50% or even chance.

2.4 0% or impossible.

2.5 100% or certain.

NOTE: OR = Addition

AND = Multiplication

Activity 4

3. Dr. Osei obtained four qualifications from three different Universities, which are UNISA, WITS and UKZN. The qualifications are B. Ed, B. Ed Hons, M. Ed, Ph.D.

Study the two-way table and answer the question that follows.

	UNISA (UN)	WITs (W)	UKZN (UK)
B. Ed (B)	BUN	**a**	**b**
B. Ed Hons (BH)	**c**	BHW	**d**
M .Ed (M)	**e**	MW	**f**
Ph. .D	**g**	**h**	PUK

Complete the following table to show different possible combinations of universities and qualifications of Dr. Osei.

3.1 How many compounds outcomes are there in total?

3.2 What is the probability of Dr. Osei obtaining M. Ed in a university?

3.3 What is the probability of him enrolling in a university?

3.4 What is the probability of obtaining B. Ed at UNISA?

3.5 What is the probability of him obtaining PhD?

Activity 5

4. Mana High School is a school situated in Amajuba District. The school has 1200 learners and 39 teachers. The table below shows the break down of gender, grades and actual number of teachers and learners per grade. Study the tables below and answer the questions that follow.

TABLE 1: Teachers

Males	11
Females	28

TABLE 2: Learners

GRADES	MALE	FEMALE	TOTAL
8	82	93	**A**
9	98	100	198
10	114	**B**	326
11	138	147	285
12	**C**	121	216

4.1 Calculate the value of **A, B** and **C** in TABLE 2.

4.2 What is the probability of getting a male teacher in Mana High School?

4.3 What is the probability of getting a male learner in Mana High School?