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TOTAL MARKS

NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2021

# MATHEMATICAL LITERACY: PAPER I

**EXAMINATION NUMBER**

Time: 3 hours 150 marks

## PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:
   - 25 pages that include 1 page at the end for extra calculations or rough work.
   - 5 questions.
2. Please check that your question paper is complete.
3. Answer ALL FIVE questions.
4. Answer ALL the questions in the spaces provided on the question paper and hand it in at the end of the examination session.
5. A non-graphical, non-programmable calculator may be used.
6. ALL necessary calculations must be clearly shown.
7. Units of measurement must be included where applicable.
8. It is in your own interest to write legibly and to present your work neatly.
9. Diagrams are not necessarily drawn to scale.
10. ONE blank page (page 25) is included at the end of the paper. If you run out of space for a question, use this page. Clearly indicate the question number of your answer should you use this extra space.

| Question | 1 | | 2 | | 3 | | 4 | | 5 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Marker | Mod. | Marker | Mod. | Marker | Mod. | Marker | Mod. | Marker | Mod. | Marker | Mod. |
| Mark | | | | | | | | | | | | |
| Signature | | | | | | | | | | | | |
| Total | 35 | | 26 | | 16 | | 42 | | 31 | | 150 | |

## QUESTION 1

Nozipho is a Grade 12 learner, who is passionate about Dramatic Arts. She has dreams of working in the movie industry in the future.

1.1 Nozipho intends studying for a Bachelor of Arts degree in the motion picture medium at Africa Film Drama Art (AFDA) school after matriculating. She finds the following abridged payment plan for her first year of online tuition.


**PAYMENT PLANS | JHB, CPT & DBN CAMPUSES**

| 1st TIME ENROLLING STUDENTS | Registration Payable Upfront | Deposit Payable Upfront | Balance | Installment | Total Tuition |
|---|---|---|---|---|---|
| A] UPFRONT | R1 950 | R14 000 | R81 894 | R81 894 | R97 844 |
| B] MONTHLY | R1 950 | R14 000 | R86 805 | R8 681 | R102 755 |

**Note:**

In order to qualify for the discounted tuition in Payment Plan A, the payment of the total tuition must be settled in full on or before 31 March 2021.

[Source: <https://www.afda.co.za/>]

Use the above information to answer the questions that follow.

1.1.1 List ALL the AFDA campuses which uses this payment plan.

_____

_____

(2)

1.1.2 State two ways that tuition fees can be paid.

_____

_____

(2)

1.1.3 Give the deposit amount that is payable upfront for any payment plan chosen.

_____

_____

(2)

1.1.4 Show how the total tuition amount of R97 844 was calculated.

(2)

1.1.5 Calculate what percentage of the total tuition amount of R97 844 is the deposit.

(2)

1.1.6 When must payment Plan A be fully paid to enjoy the special concession?

(2)

1.1.7 Calculate how much you will save if you chose Payment Plan A instead of Payment Plan B.

(2)

1.2 Nozipho plans to study away from home. She draws up the following monthly budget to control her monthly spending.

| **Income** | | |
|---|---|---|
| Monthly Allowance | | R6 000 |
| **Expenses** | | |
| Rent | R2 200 | |
| Food | R1 800 | |
| Toiletries | R400 | |
| Doctor/Dentist | R300 | |
| Cellphone | R150 | |
| Entertainment | R300 | |
| Transport (taxi/Bus fare) | R300 | |
| Surplus/deficit | | R550 |

Use the above budget to answer the questions that follow.

1.2.1 Give one example from Nozipho's budget of:

(a) a fixed expense.

_____

(2)

(b) a variable expense.

_____

(2)

(c) an occasional expense.

_____

(2)

1.2.2 (a) Show how the surplus/deficit amount of R550 was calculated.

_____

_____

_____

_____

(3)

(b) Is the amount of R550 a surplus or a deficit?

_____

_____

(2)

1.2.3 Nozipho's dad works in Nigeria and sends her monthly allowance in Nigerian naira.

| **Currency** | **Per South African rand** | **To South African rand** |
|---|---|---|
| Egyptian pound (E£) | 1,0694 | 0,9351 |
| European euro (€) | 0,0561 | 17,8253 |
| New Zealand dollar ($) | 0,0969 | 10,3199 |
| Nigerian naira (₦) | 26,0496 | 0,03839 |
| U.S. dollar ($) | 0,0683 | 14,6413 |

[Source: <https://www.corporateinformation.com/Currency-Exchange-Rates>]

Nozipho must convert her allowance to South African rand. Write down the exchange rate she must use.

Write the rate in the form R1 : _____ (2)

1.3 Nozipho is doing research on the gross earnings of the top 10 films of all time. She found the following data online.

| Year | Film | Worldwide Gross Earnings |
|---|---|---|
| 2019 | Avengers: Endgame | $2 797 800 564 |
| 2019 | Star Wars: The Rise of Skywalker | $1 072 944 222 |
| 2019 | The Lion King | $1 654 409 423 |
| 2018 | Avengers: Infinity War | $2 044 540 523 |
| 2017 | The Fate of the Furious | $1 236 703 796 |
| 2016 | Captain America: Civil War | $1 151 918 521 |
| 2015 | Avengers: Age of Ultron | $1 396 099 202 |
| 2015 | Star Wars: The Force Awakens | $2 065 478 084 |
| 2011 | Pirates of the Caribbean: On Stranger Tides | $1 045 663 875 |
| 2007 | Pirates of the Caribbean: At World's End | $ 963 420 425 |

[Source: <https://www.the-numbers.com/movie/budgets/all>]

Use the above table to answer the questions that follow.

1.3.1 Explain the difference between discrete and continuous data.

_____

_____

_____

_____

(2)

1.3.2 Write down the maximum and minimum gross earnings.

Minimum = _____

Maximum = _____

(2)

1.3.3 Arrange the data in descending order of worldwide gross earnings.

**Worldwide Gross Earnings**

(2)

1.3.4 Write the worldwide gross earnings of "The Lion King" in words.

(2)
**[35]**

## QUESTION 2

James is a South African National Parks field ranger who works in the anti-poaching unit.

2.1 James needs to purchase a new laptop bundle to be able to do his work in the field. He finds the following advertisement online.


**Option 1 Cash Price:**

R11 099 (including VAT)

**Option 2 Hire-purchase:**

Deposit 10% of the cash price.

Monthly instalments:

R564,23 × 36 months

[Source: <https://shop.fundi.co.za/product/lenovo-ideapad-i3-microsoft-bundle-0>]

Use the above advertisement to answer the questions that follow.

2.1.1 Calculate the deposit amount for this laptop bundle using Option 2.

(2)

2.1.2 Calculate the amount of VAT paid if you purchased this laptop using Option 1.

(3)

2.1.3 Calculate the number of years it would take James to pay off this bundle, if he chooses the hire-purchase option.

(2)

2.1.4 Calculate the total cost of purchasing this bundle on the hire-purchase option.

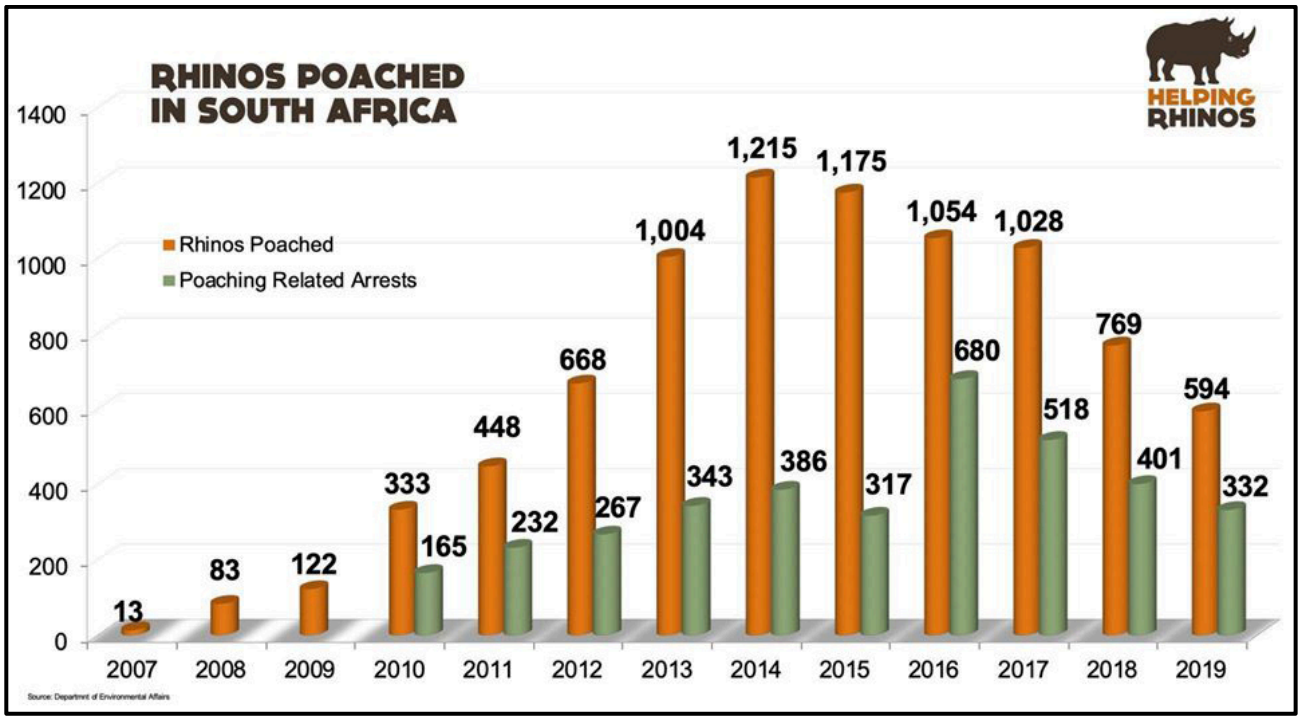
(3)

2.1.5 Calculate the amount of interest charged if this bundle is purchased on the hire-purchase option.

(3)

2.2 Rhino poaching is a major concern in South Africa. The graph below shows the number of rhinos poached and the number of poaching related arrests in South Africa from 2007–2019.




[Source: <https://www.helpingrhinos.org/2019-poaching-stats>]

Note: Digit separators are used in the data, e.g. 1,004 which is the same as 1 004, etc.

2.2.1 Use the above graph to calculate the following for the period 2007 to 2019:

(a) The mean number of rhinos poached.

(3)

(b) The median number of rhinos poached.

(2)

(c) The range of rhinos poached.

(2)

2.2.2 State, with reason, which measure of central tendency, mean or median, is the most accurate representation of the data relating to rhinos poached.

(3)

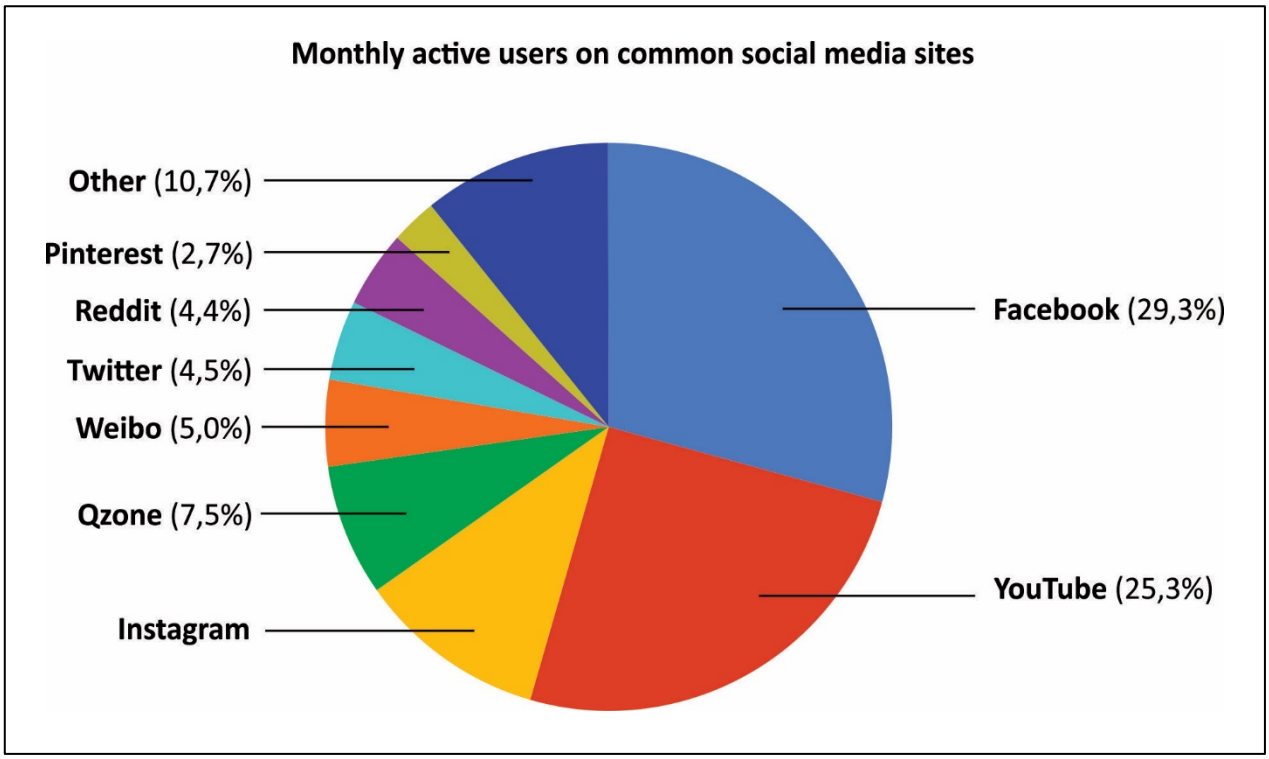
2.2.3 Describe the effect that poaching related arrests has had on the number of rhinos poached annually. Use values from the graph to support your answer.

(3)
**[26]**

## QUESTION 3

The following pie chart shows the distribution of monthly active users on common social media websites. Facebook alone has **two billion** users.




[Source: <https://courses.lumenlearning.com/>]

Use the above pie chart to answer the questions that follow.

3.1 Calculate the percentage of users on Instagram.

(2)

3.2 Calculate, in degrees, the size of the angle of the "Facebook" sector.

(3)

3.3 Determine the probability of randomly selecting a Reddit user.

(2)

3.4 Determine, rounded to the nearest million, the approximate number of users on YouTube per month.

(5)

3.5 (a) Explain why a pie chart is an appropriate representation to illustrate this data.

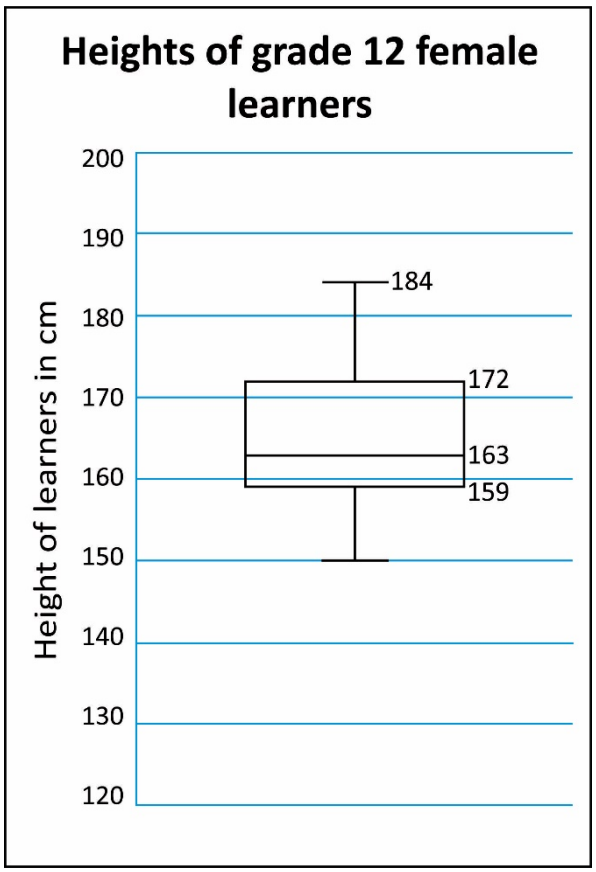
(2)

(b) Explain whether the data shown represents categorical data or numerical data.

(2)
**[16]**

## QUESTION 4

4.1 The following box-and-whisker plots show the heights, in cm, of a class of 32 grade 12 female learners.




Use the box-and-whisker plot to answer the questions that follow.

4.1.1 Write down the median height.

(2)

4.1.2 Calculate the interquartile range.

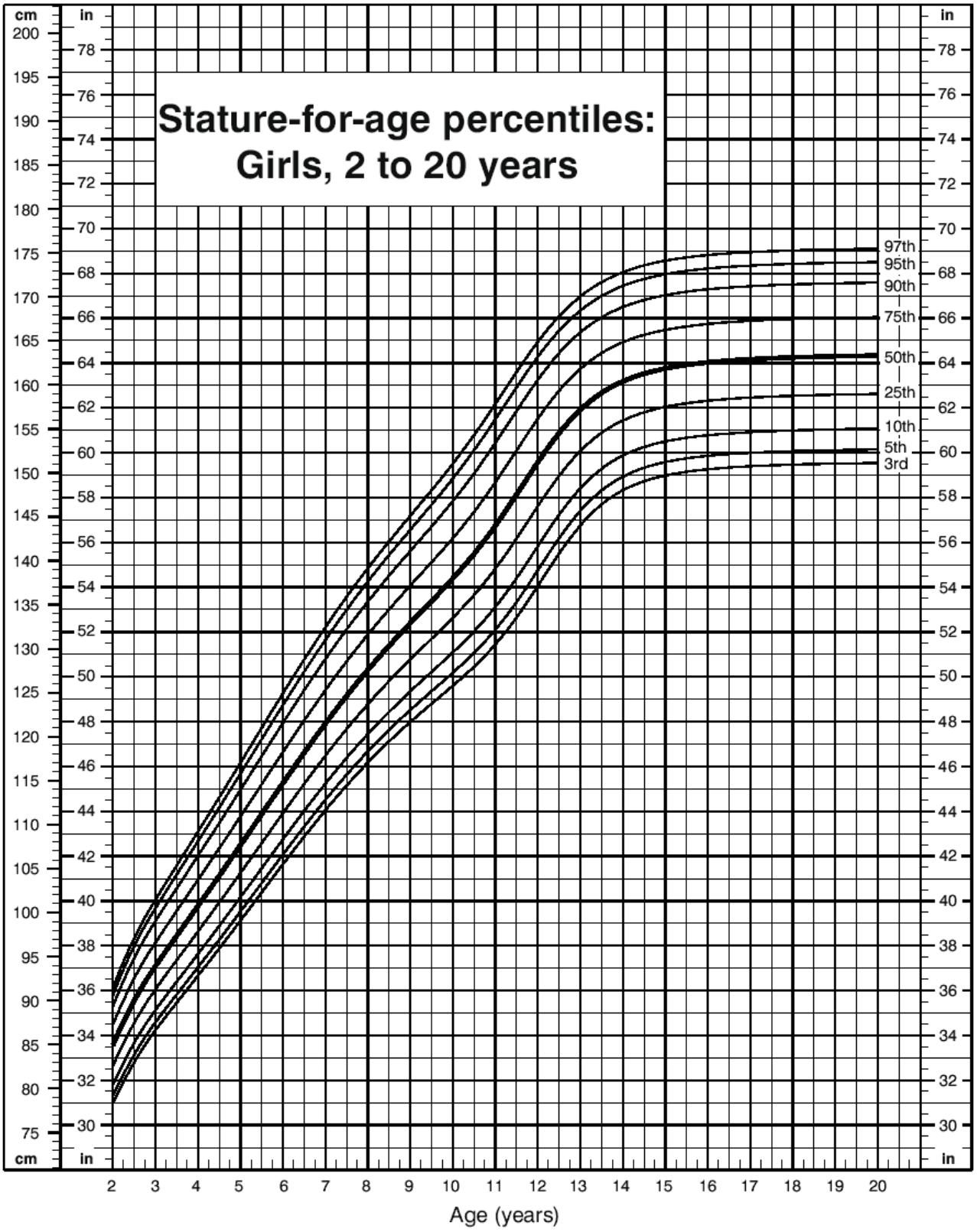
$$IQR = Upper\ Quartile - Lower\ Quartile$$

(2)

4.1.3 Calculate how many learners lie above the Upper Quartile.

(2)

4.2 The growth chart below shows the stature (height) for age percentiles for girls aged 2–20.




[Source: <https://upload.wikimedia.org/wikipedia/commons/4/47/Female_Growth_Chart>]

Use the growth chart together with the box-and-whisker plot from **Question 4.1** to answer the questions that follow.

4.2.1 If a girl is 1,65 m tall and 18 years old, between which two percentiles will her height lie.

(2)

4.2.2 Given a 16-year-old girl had a height equal to the lower quartile value in **Question 4.1**. Determine on which approximate percentile this height will lie.

(2)

4.2.3 If the minimum height read from the diagram in **Question 4.1** lies on the 3rd percentile, then determine the possible age of the learner.

(2)

4.2.4 Explain how a girl whose height lies on the 80th percentile compares with other girls her age.

(2)

4.3 Consider the following three internet options from SuperWeb.


**Option A:** *Uncapped Fibre
Fixed cost of R700 per month

**Option B:** Capped Fibre 100 gigabytes (GB) of *capped data per month
Fixed cost of R600 per month
If you run out of data, you can "top up" at a rate of R3 per GB

**Option C:** Fixed LTE
No fixed cost. R5 per gigabyte (GB)

*Uncapped: This means you have unlimited data usage per month.
*Capped: This means you have a limited amount of data usage per month.

4.3.1 If you use 100 GB of data in one month, calculate the amount you will then pay for **Option A**.

(2)

4.3.2 State the amount you will be charged for using 100 GB of data during the month for **Option B**.

(2)

4.3.3 Use the following equation to calculate the missing values (a) and (b) for **Option B** in the table below:

Cost $= 600 + 3(n - 100);\ n \geq 100$, where $n$ is the number of gigabytes used per month.

| Number of gigabytes $(n)$ | 0 | 100 | 101 | 125 | (b) | 200 |
|---|---|---|---|---|---|---|
| Cost in rand | 600 | 600 | (a) | 675 | 750 | 900 |

(3)

4.3.4 (a) Use **Option C** to calculate the missing values (i), (ii) and (iii) in the table below.

| Number of gigabytes $(n)$ | 0 | 100 | (iii) | 200 |
|---|---|---|---|---|
| Cost in rand | (i) | (ii) | 600 | 1 000 |

(3)

(b) Write down an equation that shows the relation between the cost per month **$(C)$** and the number of gigabytes **$(n)$** used during the month for **Option C**.

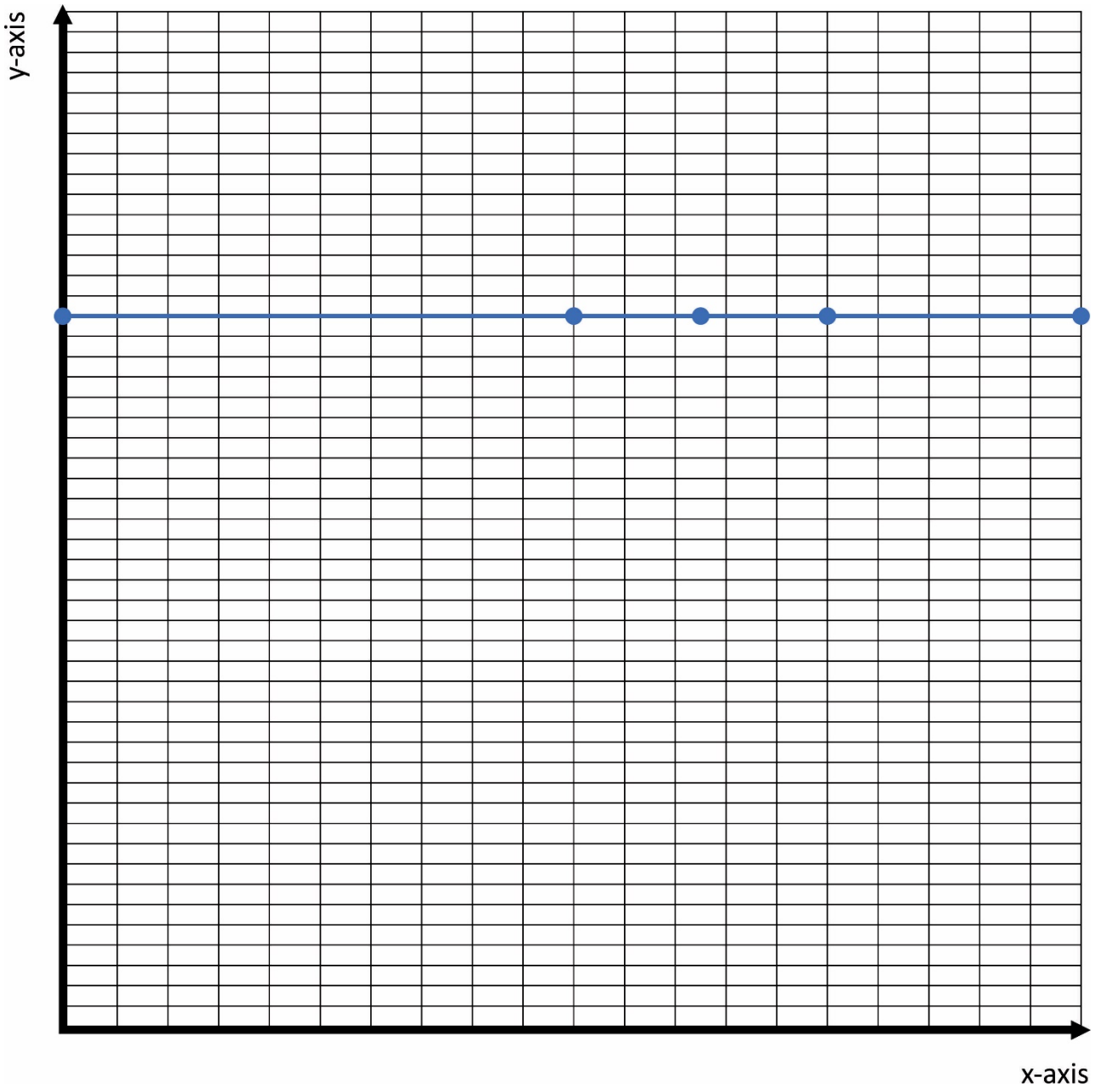
(2)

4.3.5 The grid below shows the graph for **Option A.**

Use your completed tables from **Question 4.3.3 and Question 4.3.4** to draw **two more line graphs** on the same grid below, which shows the relationship between the number of gigabytes used and the cost per month for **Option B and Option C.**

Provide a suitable heading and labels for both axes and label each graph.

Use the following scale:
Horizontal (x-axis): 2 blocks = 20 units
Vertical (y-axis): 5 blocks = 100 units




Remember to include all missing graph elements.

(9)

4.3.6 (a) Indicate using the letter **Z** on the *y*-axis where the internet options cost the same for **Options B and C**.

(2)

(b) State how many gigabytes have been used at point Z in **Question 4.3.6(a)** above.

_____

_____

(2)

4.3.7 Use your graphs in **Question 4.3.5** to justify when **Option C** would be the most cost-effective.

_____

_____

_____

_____

(3)
**[42]**

## QUESTION 5

Good financial planning for your retirement is very important as it gives you and your family financial freedom after you retire.

5.1 Silumko saved for his retirement by contributing to a pension fund since he started working in January 1975. He retired at the end of December 2020. He decides to take one-third of his pension fund as a lump sum and invest the balance in an *annuity. His lump sum amounted to R1 400 000 before tax.

*An annuity is a financial product that pays you a regular income after retirement.

5.1.1 For how many years did Silumko work?

(3)

5.1.2 (a) Calculate Silumko's total pension fund amount.

(3)

(b) Hence, calculate the amount Silumko will invest in an annuity.

(2)

5.1.3 Silumko's lump sum benefit amount is taxable according to the following tax table.

**Retirement lump sum benefit tax table**

| **2021 tax year (1 March 2020 – 28 February 2021)** | |
|---|---|
| Taxable income (R) | Rate of tax (R) |
| 1–500 000 | 0% |
| 500 001–700 000 | 18% of taxable income above 500 000 |
| 700 001–1050 000 | 36 000 + 27% of taxable income above 700 000 |
| 1 050 001 and above | 130 500 + 35% of taxable income above 1 050 000 |

[Source: <https://www.sars.gov.za>]

Silumko calculated that his lump sum benefit after tax would be R1 147 000. Show, by calculation, whether he was correct or not.

(6)

5.1.4 Explain how Silumko can avoid paying any tax on a retirement lump sum amount. *Hint: Use the tax table to help you.*

(3)

5.1.5 Silumko invests 15% of his R1 147 000 in a Moneymarket account for two years at an interest rate of 4,4% p.a. compounded annually. Show, by calculation, that the accumulated invested value will exceed R187 000 at the end of two years.

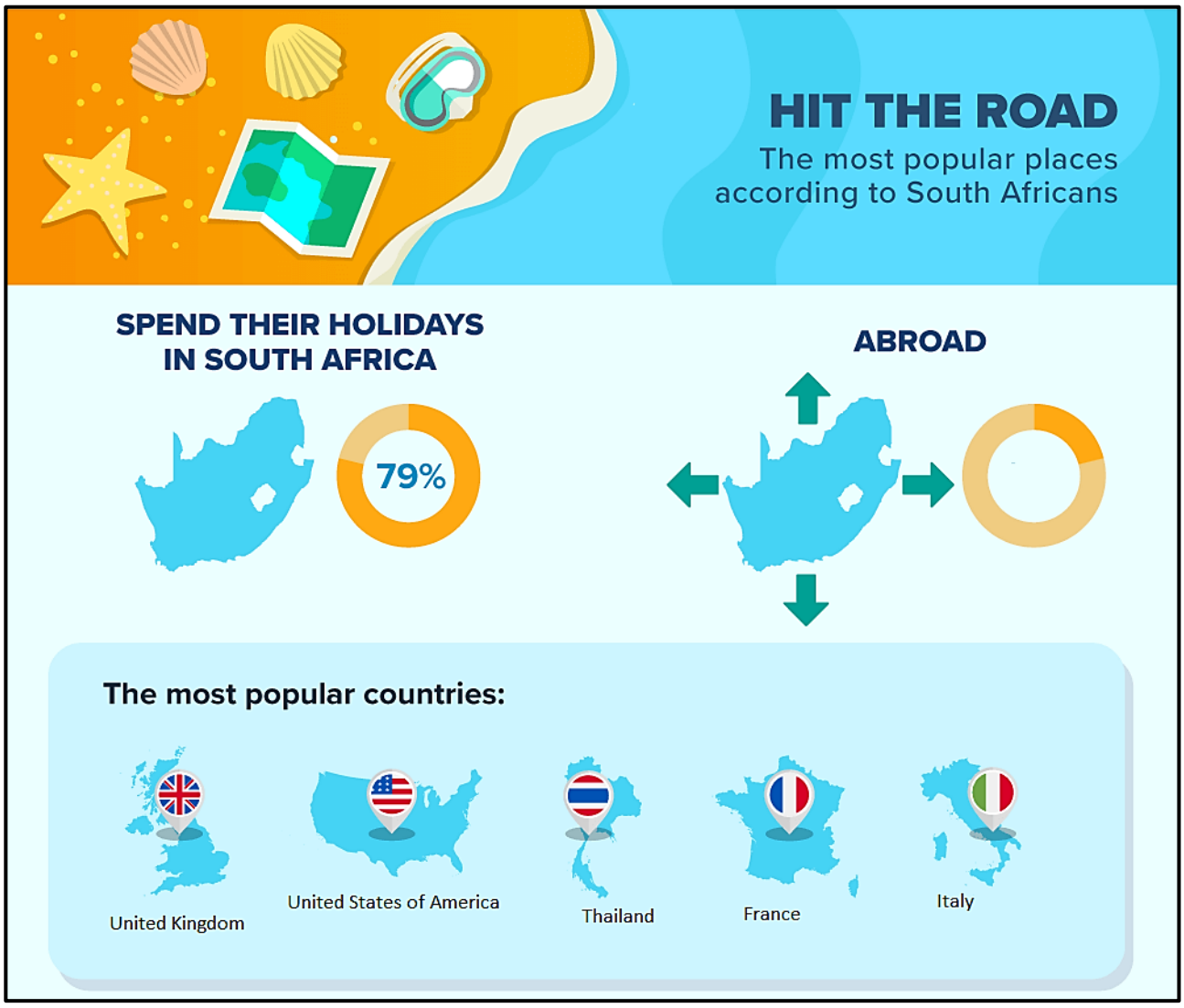
(6)

5.1.6 The South African inflation rate is currently 3,2% p.a. Explain the effect this will have on Silumko's investment.

(3)

5.2 Use the infographic below to answer the questions that follow.




[Source: <https://www.getaway.co.za/>]

5.2.1 Determine the probability that Silumko will holiday abroad.

(2)

5.2.2 Silumko randomly chooses a country from the list of most popular countries. Determine, as a decimal fraction, the probability he will choose a country with the letter T in its name, if choosing any of the countries are equally likely.

(3)
**[31]**

**Total: 150 marks**

**ADDITIONAL SPACE TO ANSWER QUESTIONS. CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE ALL ANSWERS ARE MARKED.**