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NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2023

MATHEMATICAL LITERACY: PAPER I

EXAMINATION NUMBER

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Time: 3 hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:
 - 24 pages that include 3 pages at the back 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 on the question paper and hand this in at the end of the examination. Remember to write your examination number in the space provided.**
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. Maps and diagrams are not necessarily drawn to scale.
10. THREE blank pages (page 22–24) are included at the end of the question paper. If you run out of space for a question, use these pages. 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	33		30		31		38		18		150	

QUESTION 1

Lwandle Dlamini is a young first-year Mathematical Literacy teacher in Durban.

- 1.1 Lwandle is employed by the eThekweni High School's Governing Body. He receives a copy of his salary slip via email.

eThekweni High School			
		23 Protea Road Morningside Durban 4001	
Employee Name:	Dlamini, Lwandle		
Period:	2022-04-01 to 2022-04-30		
ID Number:	9905305065088		
Employee Number:	E041		
Employment Date:	1 January 2022		
Employee Address:	14 Morningside Court 7 Innes Road Durban		
Banking Details:	Standard Bank, Cheque Account 52347781		
Income		Deductions	
Basic Salary	22 100,56	Tax	Question 1.1.5 (b)
Laptop Allowance	1 500,00	UIF	177,12
Medical Aid	800,00	SACE	15,00
Housing Allowance	500,00	Old Mutual RA	1 500,00
Total Income:	Question 1.1.5 (a)	Total Deductions:	4 507,37
		NETT PAY: Question 1.1.5 (c)	
Note: RA is Retirement Annuity			

Use the above information to answer the questions that follow.

- 1.1.1 Calculate how many months Lwandle Dlamini has been teaching at this school.

(2)

- 1.1.2 Give the name and address of Lwandle's employer.

(2)

1.1.3 List two monthly deductions Lwandle pays from his salary.

(2)

1.1.4 Calculate the amount that Lwandle receives for housing per year.

(2)

1.1.5 (a) Calculate the missing total income amount on this salary slip.

(2)

(b) Determine, with the use of calculations, the missing tax amount on this salary slip.

(2)

(c) Calculate the missing NETT PAY amount on this salary slip.

(2)

1.1.6 Calculate what percentage of Lwandle's basic salary goes towards his RA contribution each month.

(3)

1.1.7 (a) What does the acronym UIF stand for?

(2)

(b) When would Lwandle be able to claim from UIF?

(2)

1.2 During one of his Mathematical Literacy lessons, Lwandle gave his Grade 12 students a survey to complete. A summary of the data is shown below:

Summary of Survey Results	
<p>Student Gender: Male: 15 Female: 17</p>	<p>Student's Home Language English: 8 Zulu: 23 Afrikaans: 1</p>
<p>Student Age: 17 years: 5 18 years: 21 19 years: 5 20 years: 1</p>	<p>Student's plans for 2023 after finishing Grade 12: Work: 9 Study: 21 Travel: 2</p>
<p>Type of House: Informal settlement: 6 Flat: 17 House: 8</p>	

Use the above information to answer the questions that follow.

1.2.1 Give another example of an instrument, besides a survey, that Lwandle could have used to collect this data.

(2)

1.2.2 Determine how many students completed this survey.

(2)

1.2.3 State the maximum age of the students that completed this survey.

(2)

1.2.4 Calculate the percentage of students that had Zulu as their home language.

(2)

1.2.5 State which home language had the lowest number of students represented in the survey results.

(2)

1.2.6 Calculate the probability that a Grade 12 student will study after they finished matric in 2022.

(2)

[33]

QUESTION 2

The Commonwealth Games is a quadrennial* international multi-sport event among athletes from the Commonwealth of Nations. The latest games were held in Birmingham, England, from 28 July to 8 August 2022.

* Quadrennial means it occurs every four years.

2.1 The following table shows the Commonwealth Games medals of the top 10 nations of all times and includes all the medals from the 1st Games in Canada in 1930 to the 22nd Games in England in 2022.

"Top 10 Nations Medals table from 1930 to 2022"

Rank	Nation	Gold	Silver	Bronze	Total
1	 Australia	932	774	709	2 415
2	 England	714	715	715	2 144
3	 Canada	484	516	555	1 555
4	 India	181	173	149	503
5	 New Zealand	159	220	278	657
6	 South Africa	130	123	136	389
7	 Scotland	119	132	200	451
8	 Kenya	85	75	77	237
9	 Nigeria	70	75	91	236
10	 Wales	67	98	141	306
Totals: 10 nations		2 941	2 901	3 051	8 893

[Source: <https://en.wikipedia.org/wiki/Commonwealth_Games>]

Use the above information to answer the questions that follow.

2.1.1 (a) Calculate the mean for the total number of medals won for these top 10 nations.

(2)

(b) Determine the median number of gold medals won for these top 10 nations.

(2)

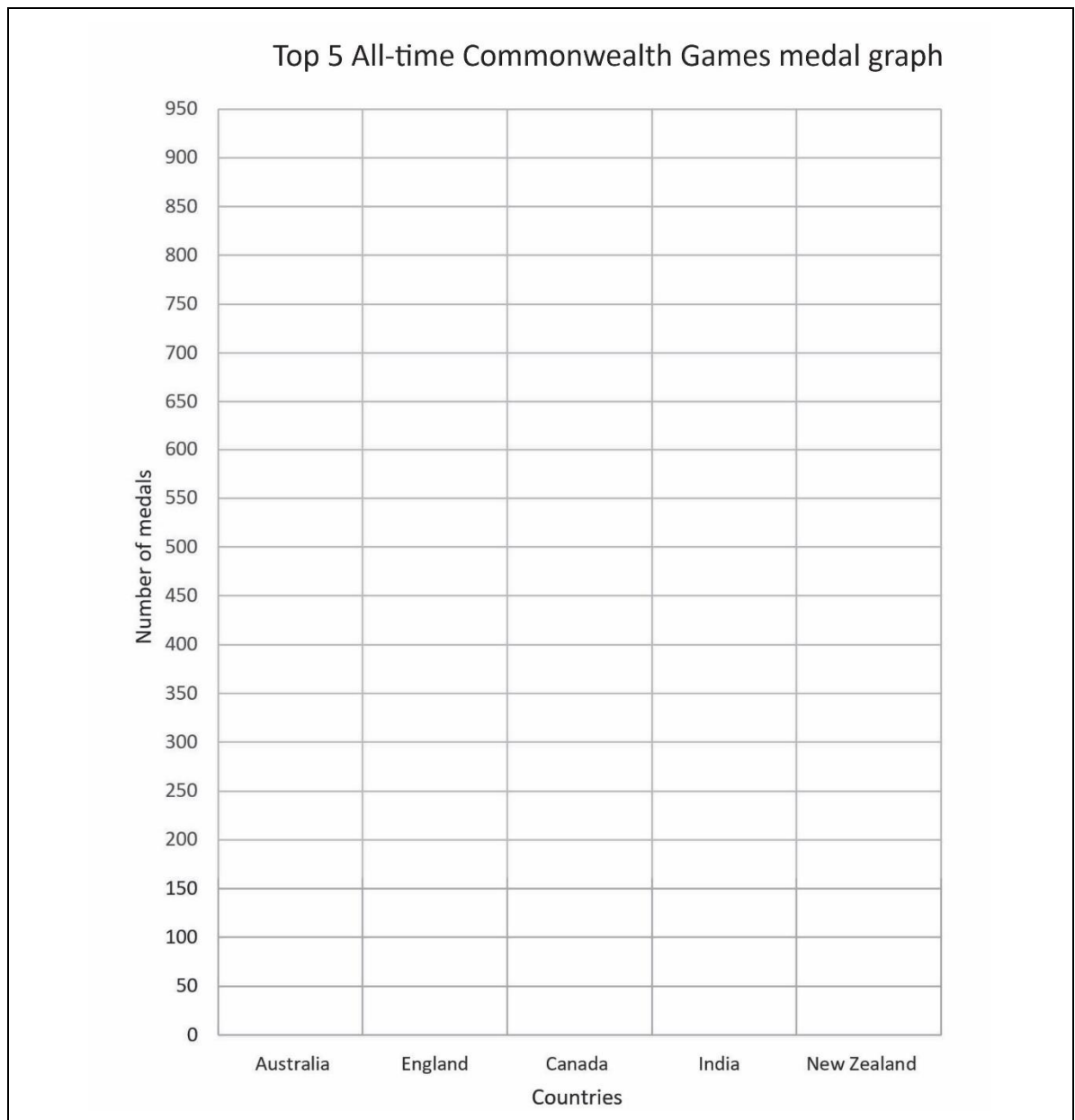
(c) Calculate the range of bronze medals won for these top 10 nations.

(2)

(d) Name the country or countries that received the least number of silver medals.

(2)

2.1.2 Use the Commonwealth Games medal table of all times to draw an appropriate graph for the top 5 countries on the grid below. Your graph should show the number of each type of medal (gold, silver and bronze) won by the top 5 countries in rank order.



(7)

2.2 The British Government covered an amount of £778 million, which was 75% of the total cost of the Commonwealth Games in Birmingham City. The balance of the cost was covered by the Birmingham City Council.

2.2.1 Determine what fraction of the total cost was covered by the Birmingham City Council.

(2)

2.2.2 (a) Calculate the actual amount covered by the Birmingham City Council.

(4)

(b) Calculate the total cost of the Birmingham Commonwealth Games.

(2)

(c) Use the exchange rate table below to convert your answer in **Question 2.2.2 (b)** into South African rand. Round off to the nearest million rand.

1 British pound	1,1725 US dollar	1,18571 euro
1 South African rand	0,059614 US dollar	0,058549 euro

[Source: <<https://www.x-rates.com/calculator/>>]

(5)

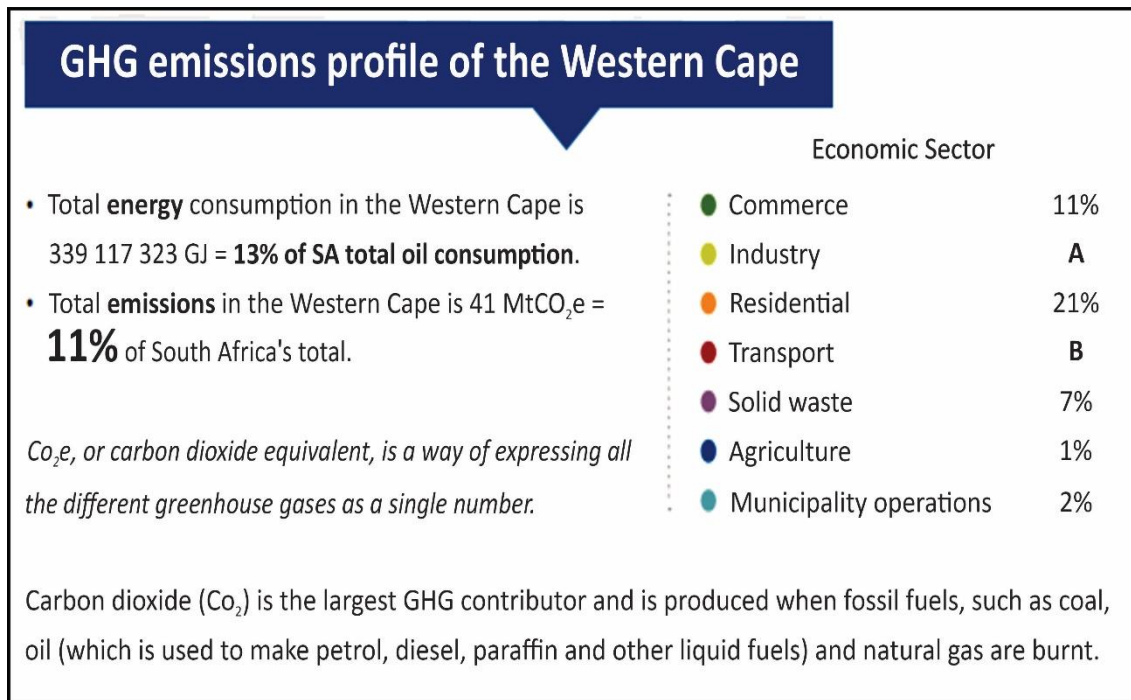
(d) Write your answer from **Question 2.2.2 (c)** in words.

(2)
[30]

QUESTION 3

Climate change is the result of a sharp increase in greenhouse gases (GHG) trapped in the earth's atmosphere. South Africa is not safe from the effects of climate change. In 2015, South Africa recorded its lowest annual rainfall since 1904 and Cape Town recorded its highest temperature in the last 100 years, at 42 °C.

3.1 The following infographic shows the GHG emissions of the Western Cape and the total energy consumption in the Western Cape.



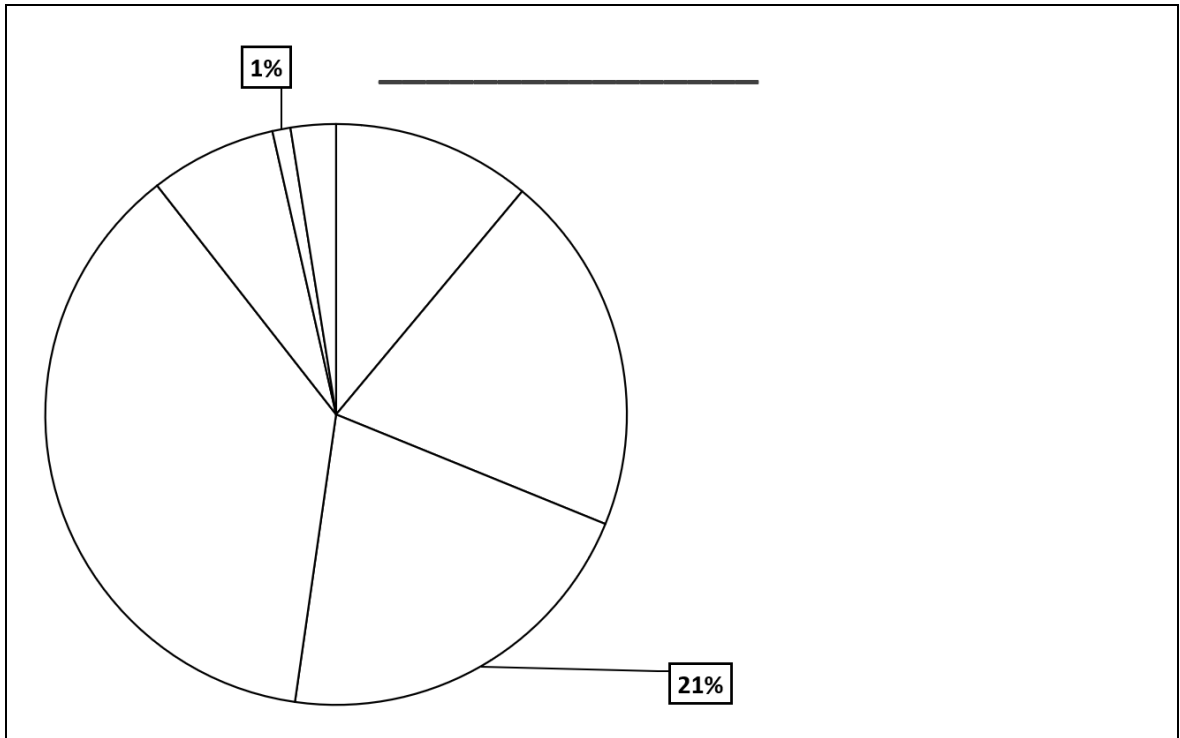
[Source: <<https://www.westerncape.gov.za/text/2018/June>>]

Use the information above to answer the questions that follow.

3.1.1 Calculate the missing percentages, A and B, in the economic sector, if the industrial sector is 20 times larger than the agricultural sector and the transportation sector is the biggest sector by 18%.

(4)

3.1.2 Use your answer from **Question 3.1.1** and the values in the infographic to complete the missing percentages in the pie chart below.



Include all graph elements when completing the pie chart. (6)

3.1.3 Calculate the total number of barrels of oil used in South Africa if one gigajoule (GJ) is equal to 0,17 barrels of oil. Round off to the nearest whole number.

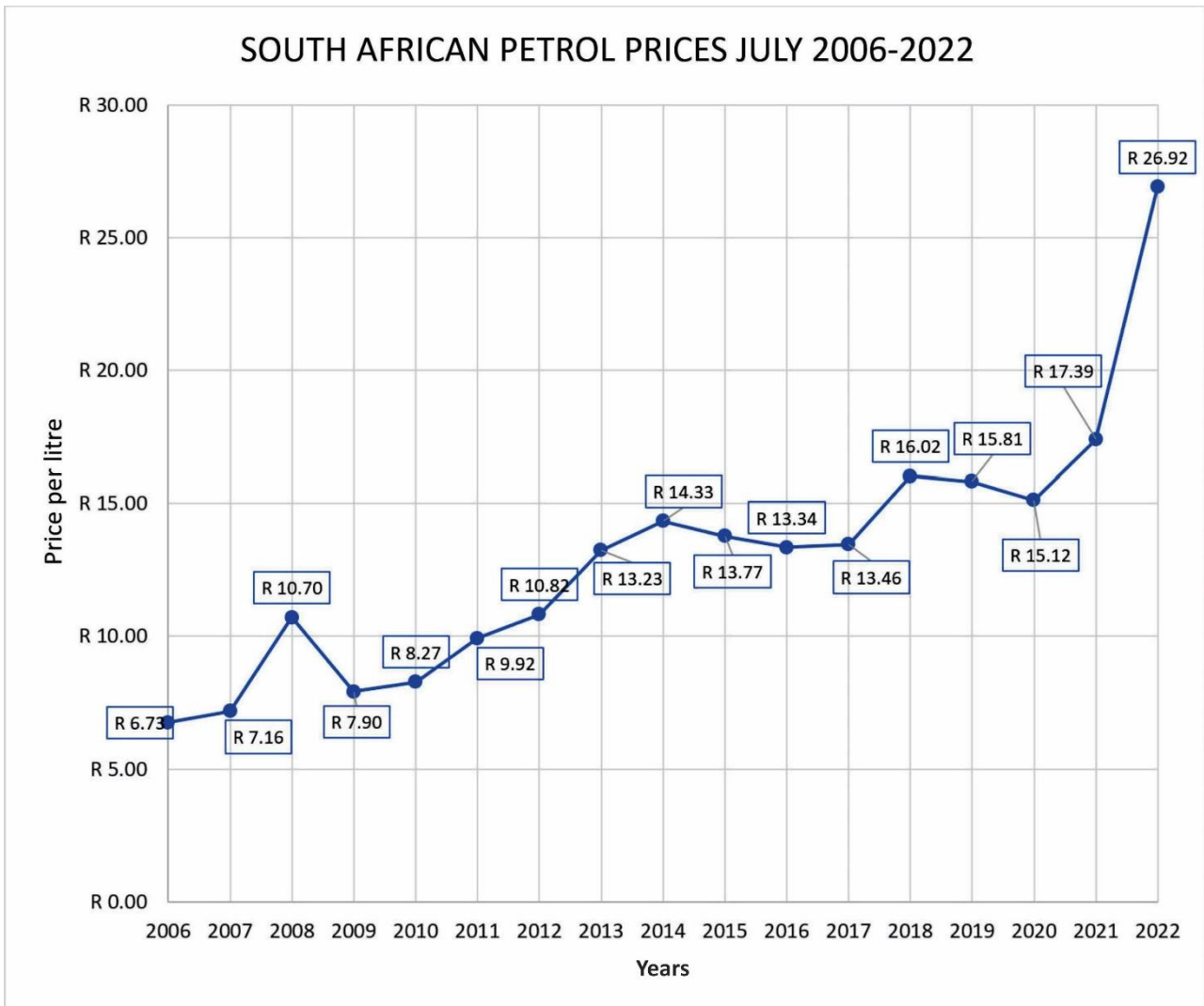
(5)

3.1.4 Calculate, to four decimal places, the rand/dollar exchange rate in July 2022, if one barrel of oil costs \$130 or R2 187 per barrel.

Write the rate in the form R1: \$_____

(4)

3.2 The graph below shows the South African petrol prices for the period July 2006 to July 2022. The data given represents the July figures for each year.



[Source: <<https://topauto.co.za/features/51284/south-africas-petrol-prices-more-than-doubled-in-5-years/>>]

Use the information above to answer the questions that follow.

QUESTION 4

With the increasing petrol prices and the concerns over climate change, the hybrid engine* vehicles are becoming more popular in South Africa. Toyota has released a number of their models with a hybrid engine option.

* A hybrid engine combines at least one electric motor with a gasoline engine to move the car, and its system recaptures energy via regenerative braking.

4.1 The cash price of the new top of the range Toyota RAV4 2,5 VX CVT Hybrid E-Four is R628 900 exclusive of VAT.

It can be financed (hire-purchased) with most South African banks as follows:

- Payment period: 5 years
- Interest rate: 9,5% per annum.
- Deposit: 10% of cash price inclusive of VAT
- Loan amount: R650 911,50
- Monthly repayments: R13 764



Use the information above to answer the questions that follow:

4.1.1 (a) Calculate the amount of VAT payable on this RAV4.

(2)

(b) Hence, determine the total cash price of this RAV4.

(2)

4.1.2 (a) Calculate the total cost of purchasing this RAV4 on hire-purchase.

(3)

(b) Hence, calculate the total interest amount that is charged on this RAV4 if purchased on hire-purchase.

(2)

4.1.3 Show, using the formula below, whether the quoted interest rate of 9,5% per annum is correct or not.

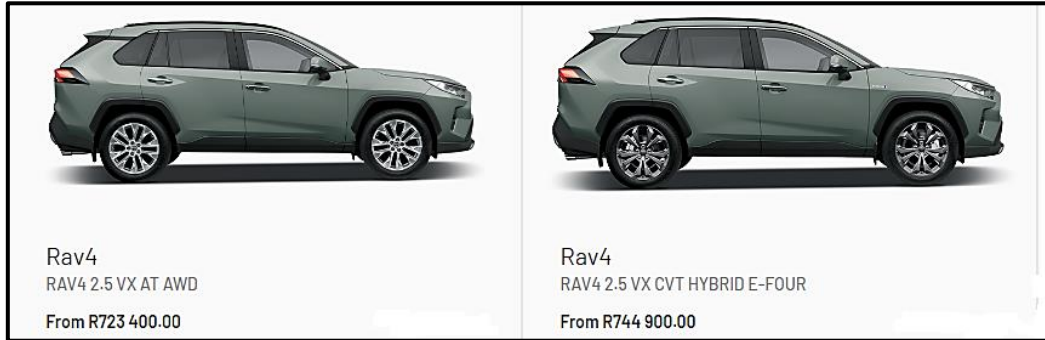
$$\text{Total interest} = \text{loan amount} \times \frac{\text{rate}}{100} \times \text{number of years}$$

(3)

4.1.4 Financial experts recommend that you do not spend more than 20% of your gross monthly salary on a vehicle repayment. Show, using calculations, that you will need to earn more than R68 500 per month to afford the monthly repayments of R13 764.

(3)

4.2 Karla Smit is planning on purchasing a RAV4 and compares the fuel consumption of the Petrol 2,5 litre and the Petrol Hybrid 2,5 models.



Models	Petrol	Hybrid
Price	R723 400	R744 900
Fuel consumption	7,3 litres/100 km	4,8 litres/100km

[Source: <<https://www.toyota.co.za/specs-compare/rav4?model=57k>>]

Petrol price = R24,99 per litre

[Source: <<https://aa.co.za/fuel-pricing/>>]



Use the above information to answer the questions that follow.

4.2.1 Karla comes up with the following two formulae for the two different RAV4 models.

$$\text{Cost of using petrol model} = R1,82427 \times \text{number of km}$$

$$\text{Cost of using hybrid model} = R21\ 500 + R1,19952 \times \text{number of km}$$

(a) Show, using calculations, how she determined the rate of R1,82427/km for the petrol model.

(3)

(b) Show, using calculations, how she determined the fixed cost of R21 500 for the Hybrid model.

(2)

4.2.2 Use the formula given in **Question 4.2.1** to complete the table below:

Number of km	0 km	10 000 km	20 000 km	(c)
Cost of fuel: petrol model	R0	R18 242,70	(b)	R182 427
Cost of fuel: hybrid model	R21 500	(a)	R45 490,40	R141 452

(a)

(2)

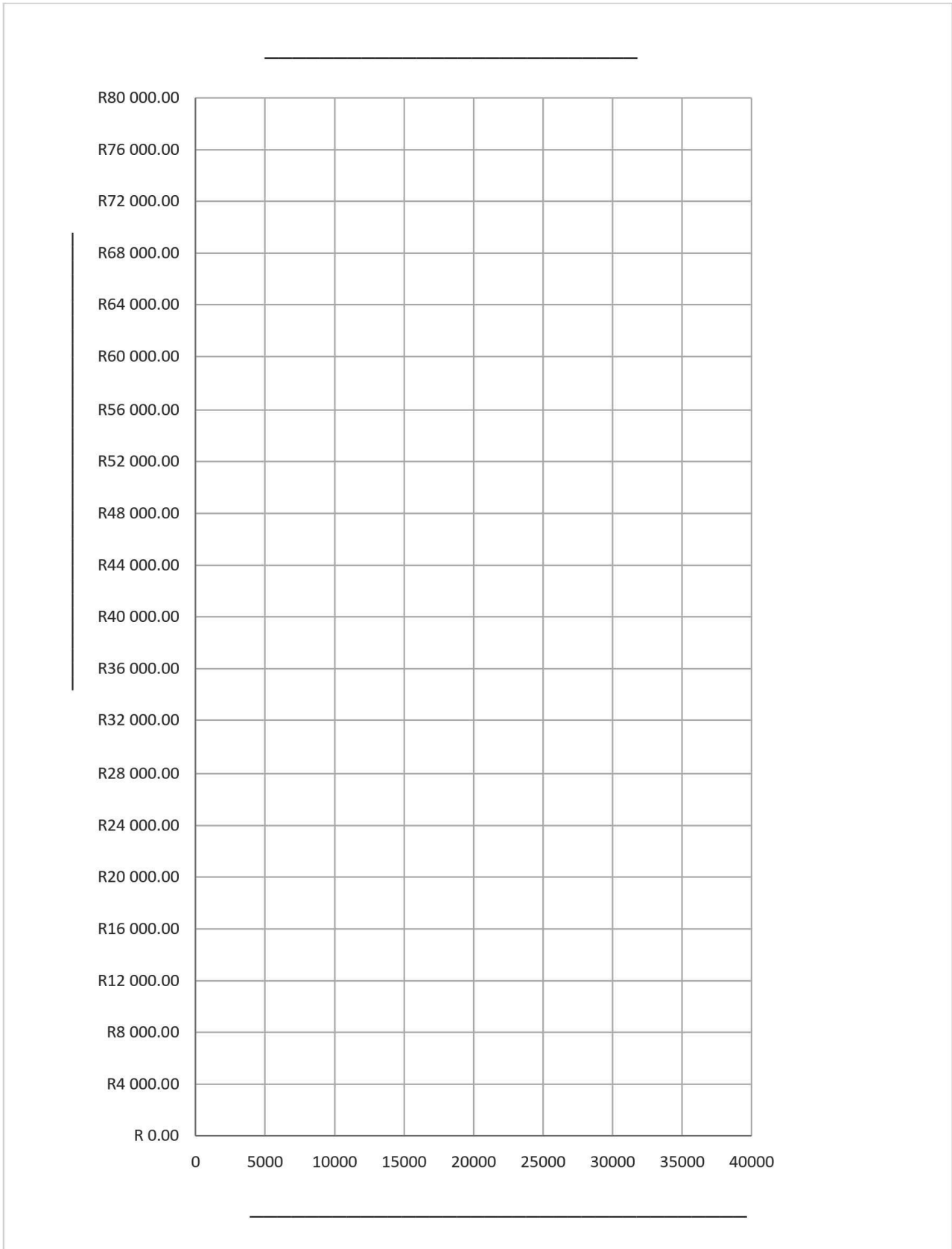
(b)

(2)

(c)

(2)

4.2.3 Use the completed table in **Question 4.2.2** to plot both cost graphs on the same set of axes below.



(5)

4.2.4 Write down, from the graphs, the number of kilometres and the cost for which both vehicles will be the same.

(2)

4.3 To raise funds, the National Sea Rescue Institute is running a competition to win a car. They sold only 360 tickets.



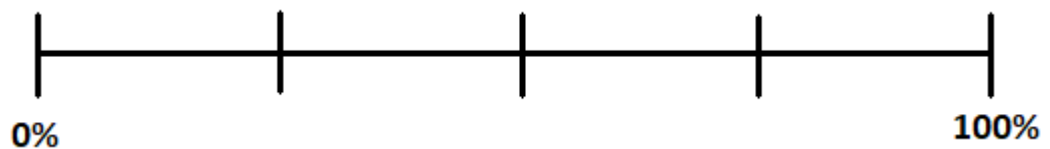
Use the above information to answer the questions that follow.

4.3.1 Calculate, as a percentage, the probability of winning the first prize if you only purchased one ticket.

(2)

4.3.2 Use the probability scale below to answer the following questions.

- (a) Indicate on the probability scale, using the letter "A", where you would read off an event that is equally likely to happen or not happen.
- (b) Using the letter B, indicate where you would place the answer to **Question 4.3.1** on the probability scale below.



(3)

[38]

QUESTION 5

In South Africa, when any property is sold, transfer duties need to be paid by the person purchasing the property. This is a government tax which is paid to SARS.

2023 tax year (1 March 2022 – 28 February 2023)

Value of property (rands)	Rates of tax (rands)
1 – 1 000 000	0%
1 000 001 – 1 375 000	3% of the value above R1 000 000
1 375 001 – 1 925 000	R11 250 + 6% of the value above R1 375 000
1 925 001 – 2 475 000	R44 250 + 8% of the value above R1 925 000
2 475 001 – 11 000 000	R88 250 + 11% of the value above R2 475 000
11 000 001 and above	R1 026 000 + 13% of the value above R11 000 000

[Source: <<https://www.sars.gov.za/tax-rates/income-tax/rates-of-tax-for-individuals/>>]

Use the information above to answer the questions that follow.

James Martin is looking at purchasing a house with a market value of R2 500 000. He sold his small flat for R1 000 000.

5.1 Explain how the person buying James Martin's flat benefitted by only paying R1 000 000. Use the value(s) from the tax table to support your answer.

(2)

5.2 Show, using calculations, how much tax James would need to pay to SARS if he offered the asking price of R2 500 000 for the house.

(4)

5.3 James's wife claimed that if the current owners of the house reduced their asking price by 5%, they would have saved exactly R10 750 in transfer costs. Verify, showing all calculations, whether James's wife's claim is valid.

(6)

5.4 Ravi stated that a person buying a house for R12 000 000 will end up paying almost 10% (**rounded to the nearest whole number**) of the value of the property in transfer costs.

Verify, showing all calculations, whether Ravi's statement is valid or not.

(6)

[18]

Total: 150 marks

