



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2014

MATHEMATICAL LITERACY: PAPER II

Time: 3 hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:

- A question paper of 14 pages
- Five questions
- Appendix A with 4 Annexures
- An Answer Sheet of 1 page

Please check that your question paper is complete.

2. Answer all the questions.

3. It is strongly suggested that all working details be shown.

4. Round off appropriately according to the context unless stated otherwise.

5. Approved non-programmable calculators may be used in all questions.

6. It is in your own interest to write legibly and present your work neatly.

7. Maps and diagrams are not necessarily drawn to scale, unless otherwise stated.

8. Please start each of the five questions on a new page.

QUESTION 1



Electronic Toll Collection (ETC), otherwise known as **e-Tolls**, allows for tolls to be collected without vehicles having to stop or slow down, i.e. there are no physical toll booths and no cash toll transactions that take place along a road or highway.

Overhead 'gantries' charge people by electronically identifying the number plates of vehicles that drive under them or by means of an e-tag. Each time a vehicle passes, a toll is charged. The cost is determined by the kilometre distance represented by the gantry.

Toll is deducted from a user's registered e-toll account associated with the vehicle and the user will be able to travel without any disruption. As part of the verification process images will be taken of the front and rear number plates as well as the top of the vehicle. The gantry equipment also measures the vehicle in order to classify it.



E-tags are small electronic discs that drivers will purchase and install in their cars. The discs will have money loaded onto them and will be linked to your account as a debit order or to your credit card. The option will be available to load money onto the e-tag in advance or to have money automatically debited from your account whenever the card is running low.

The tolls are supposed to pay for the R20 billion highway upgrade programme that has recently been completed.

[Source: Adapted from <tollfreegp.co.za>]

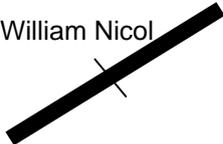
Refer to **ANNEXURE 1** in order to answer the following questions:

- 1.1 Each gantry has been given the name of a bird. Determine the number of gantries shown on this map. (2)
- 1.2 If a driver was travelling from the 'Sunbird' gantry towards the 'Flamingo' gantry, in which general direction would she be travelling? (2)
- 1.3 Determine the scale of this map if the actual distance between the Buccleuch interchange (close to Gantry 8) and the Brakfontein interchange (just after Gantry 5) is 21 km. Round off your map measurement to the nearest centimetre. (5)

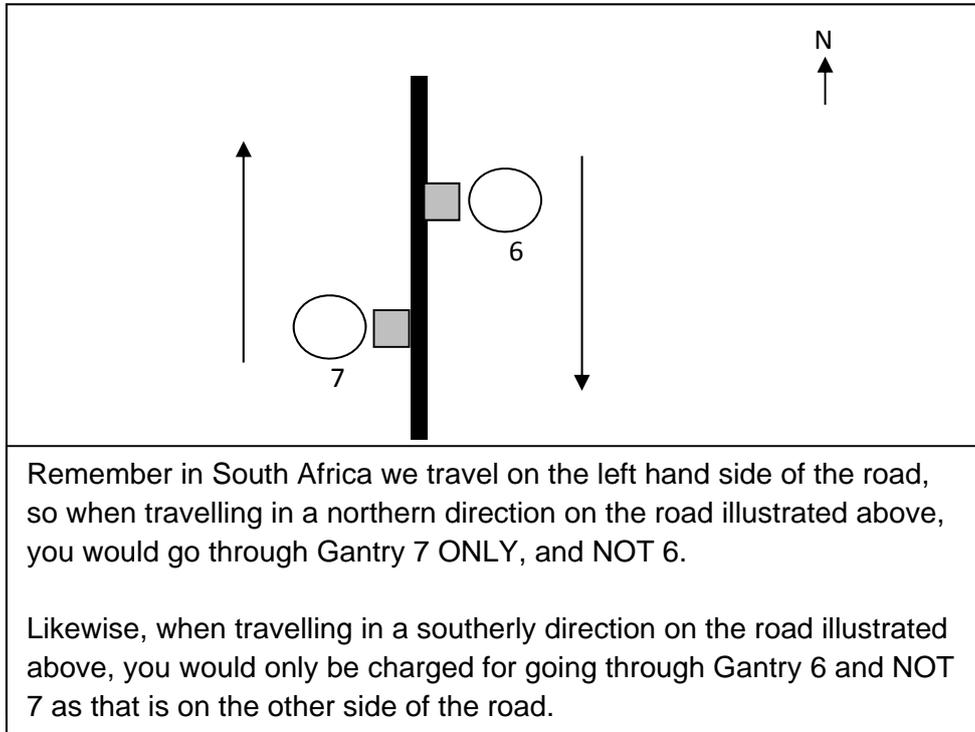
An interchange is when roads from different directions meet at one point.



On Annexure 1 it is indicated by means of a line.



1.4 John lives in Sandton and works in Centurion. He is a registered e-Toll user **with an e-tag** and drives his car along the N1 from Sandton to Centurion. He joins the N1 at the William Nichol interchange (just after Gantry 11) and leaves the N1 at the Botha interchange (just before Gantry 3).



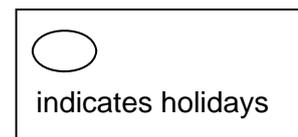
1.4.1 Calculate the total amount that John will have to pay in e-Tolls for a single trip to work. (4)

1.4.2 John travels this trip from the William Nichol interchange to the Botha interchange and back again every day for work. John's trip back home costs him R11,61 in e-Tolls.

The calendar below shows John's work schedule for the month of December 2014. He will work:

- 8 a.m. to 5 p.m. Monday to Friday
- 9 a.m. to 1 p.m. on Saturdays
- He will not work on Sundays or public holidays

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16 <small>holiday</small>	17	18	19	20	21
22	23	24	25 <small>holiday</small>	26 <small>holiday</small>	27	28
29	30	31				



Show that John's total e-Toll fees for the month of December will exceed R400. (5)

- 1.5 Calculate John's daily saving on e-Tolls by being a registered e-Toll user with an e-tag. (5)

Refer to **ANNEXURE 2** and your **ANSWER SHEET** in order to answer the following question:

- 1.6 ANNEXURE 2 is a copy of a Transaction Report that John received last year. The separate ANSWER SHEET shows a simplified e-Tolls map.

Clearly indicate **on the Answer Sheet** the route that John travelled on the 04/12/2014, from 08:59:20 to 09:14:51. (4)

- 1.7 The following is an extract from a Tax Invoice that John received along with the Transaction Report with some information missing.

VPC Account ID	1058044	VPC Tax Invoice Ref No	804605
Vehicle Licence Plate Number		Customer VAT No	N/A
Invoice Date	2013/12/23	Identification	RSA ID document
E-mail	N/A	Period	2013/12/04 to 2013/12/12

Dear John

Your e-toll VPC Tax Invoice is a consolidation of all your VPC transaction fees including VAT for the specified period. Please refer to the Payment Terms specified below for any possible discounts.

Description	VAT Rate	VAT Amount	Amount
10 GORT* Toll Transactions from 2013/12/04 to 2013/12/12	14%
Total Amount			R133.38

Payment Terms:

- The discount amount payable (incl VAT) before expiry date R 53.38
- The date on which the discount expires 2014/01/22

Please contact e-toll Customer services for an up-to-date settlement amount.

** Note that John will only receive a discount on the total amount payable if he pays before the specified date.*

- 1.7.1 Calculate the amount excluding VAT. (3)

- 1.7.2 Hence, calculate the actual VAT amount. (2)

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QUESTION 2

2.1 Logan and Thabo are going overseas after they matriculate. They will be flying from Durban to London via Dubai.

Logan and Thabo's flight itinerary is shown below:

Flight	Depart/ Arrive	Time	Airport	Terminal	Duration/ Stops	Class/ Aircraft	Booking Status
EK 776	Depart Sat 13 Dec 2014	18:45	King Shaka International Airport (DUR)		08 hr 40 min 0 Stops	Economy Boeing 777- 300ER	Confirmed
	Arrive Sun 14 Dec 2014	05:25	Dubai International Airport (DXB)	3			
→→→ Connection							
EK 001	Sun 14 Dec 2014	07:45	Dubai International Airport (DXB)	3	07 hr 50 min 0 stops	Economy Airbus A380-800	Confirmed
	Sun 14 Dec 2014	11:35	London Heathrow Airport (LHR)	3			

- *All times given are in local times, i.e. the time it will be in that country.*

2.1.1 Calculate, in hours and minutes, the waiting period at Dubai International Airport. (4)

2.1.2 Logan works out that they will spend a total of 15 hr 30 min on an aeroplane if they board 30 minutes before each flight takes off. Thabo, however, says that they will in fact spend more than 15,5 hrs on an aeroplane. Show, with calculation, who is correct. (5)

2.1.3 The boys will need to phone their parents when they arrive in Dubai to let them know they are safe. The local time, i.e. the time in Dubai will be 05:25. Calculate what the time will be in Durban then. (4)

2.1.4 Calculate the total time it will take Logan and Thabo to get to London, from the time the aircraft departs Durban to the time it lands in London. (4)

2.2 Logan saved R25 000 for the holiday.

2.2.1 When going to exchange his savings into British pounds, Logan is made aware of the fact that the bank charges their clients for converting money. The fees charged are 1,85% (with a minimum fee of R70,00) of the amount to be converted. Calculate the fees Logan will have to pay the bank when converting his R25 000 into British pounds. (3)

2.2.2 How many British pounds will Logan get if the fees are to be paid from the R25 000 and the given exchange rate is 1 British Pound = R18,3325? The bank will not pay out coins, so you need to determine the amount of pounds Logan will get taking into account that the smallest note is 5 pounds. (5)

- 2.3 Thabo's parents invested some money for him on 1 January of his Grade 8 year. They deposited R450 every month into a savings account which offered a fixed interest rate of 3,25% p.a., compounded daily based on 365 days per year of the investment.

Calculate the daily interest rate as a decimal rounded to 6 places.

(2)

- 2.4 Thabo's father is 52 years old. His annual taxable income is R410 000. With the use of the tax table given below, show that he pays more than R80 000 in tax per year.

Statutory Rates (Individuals)	
Taxable Income (R)	Rates of tax (R)
0 – 174 550	18% of each R1
174 551 – 272 700	31 419 + 25% of amount above 174 550
272 701 – 377 450	55 957 + 30% of amount above 272 700
377 451 – 528 000	87 382 + 35% of amount above 377 450
528 001 – 673 100	140 074 + 38% of amount above 528 000
673 101 and above	195 212 + 40% of amount above 673 100

Statutory Rates (Individuals)	
Primary Rebate	R12 728
Secondary rebate (for person 65 years and older)	R 7 110
Tertiary rebate (for person 75 years and older)	R 2 367

(5)
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QUESTION 3

Mrs Pillay gave birth to twins, a boy and a girl. She monitored their weight over the first 6 months which she summarised as follows:

	Baby Boy	Baby Girl
	Weight (kg)	
Birth	3,3	3,2
Month 1	4,4	4,1
Month 2	5,4	5
Month 3	6,4	5,8
Month 4	7	6,4
Month 5	7,5	6,9
Month 6	7,9	7,3

3.1 By making use of the table above and the growth chart shown on **ANNEXURE 3** determine which descriptions correctly represent the twins' growth over the 6 months. Write down the corresponding number followed by TRUE or FALSE. If FALSE, correct the statement.

3.1.1 The baby girl lay on the 10th percentile when she was born.

3.1.2 When the baby boy was 3 months old, only 10% of other baby boys were heavier than he was.

3.1.3 At the time the twins were 6 months old, they both lay close to the 50th percentile.

3.1.4 At 4 months, both babies were developing at the same rate as the average growth rate.

3.1.5 The baby boy's mass increased by a little more than 139% in the first six months of his life.

(10)

3.2 Mrs Pillay was interested in finding out more about the birth of twins. She came across the following table on the Internet.

Table: Multiple pregnancy rate, per pregnancy

	Year of treatment	2008	2009	2010 (Jan to Jun)
Age	18 to 34	31.2%	27.6%	23.9%
	35 – 37	25.0%	23.5%	22.6%
	All ages	26.7%	24.4%	22.0%

Refer to the table in order to answer the questions that follow.

3.2.1 Determine the probability, as a fraction, for all ages giving birth to twins in 2010. (2)

3.2.2 If a woman is 29 years old, determine what the percentage probability would have been in 2009 of her not giving birth to twins. (3)

3.2.3 Write the probability of a 30 year old giving birth to twins in 2010 as a ratio in simplest form. (2)

3.3 Mr Pillay realises that he will now need a bigger geyser to accommodate his bigger family. They previously had a geyser with a capacity of 100 ℓ and now have a geyser with a capacity of 200 ℓ.

The following statistics accompany the new geyser.

MODEL	ELECTRIC LOADING	OPERATIONAL PRESSURE	DIAMETER × LENGTH
50 Lt	2 kW	100 kPa or 200 kPa	450 × 610 mm
100 Lt	2 kW	100 kPa, 200 kPa or 400 kPa	550 × 840 mm
150 Lt	3 kW	100 kPa, 200 kPa or 400 kPa	550 × 1150 mm
200 Lt	3 kW	100 kPa, 200 kPa or 400 kPa	550 × 1470 mm
250 Lt	4 kW	100 kPa or 200 kPa	550 × 1875 mm

Unfortunately, the new geyser has led to a few arguments between Mr and Mrs Pillay.

Mr Pillay is convinced that because the new geyser has twice the volume of the old geyser, the actual surface area of the new geyser will also be double that of the old.

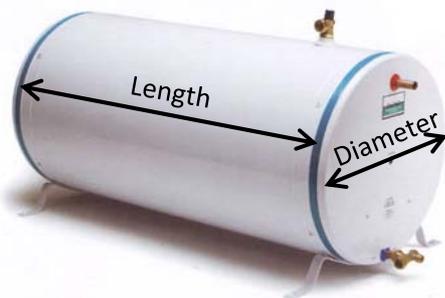
With the use of the formula below, show whether Mr Pillay is correct.

$$\text{Surface Area} = (2 \times \pi \times r \times l) + (\pi \times r^2 \times 2)$$

Where r = radius

l = length

$\pi = 3,14$



(8)

- 3.4 Mr Pillay is now confused. He decides to calculate the volume of each geyser to make sure he is not being deceived.

$$\text{Volume} = \pi \times \text{radius}^2 \times \text{height}$$

OLD 100 ℓ GEYSER:

$$\begin{aligned} & \pi \times (550 \text{ mm})^2 \times 840 \text{ mm} \\ & = 798\,278\,693,3 \text{ mm}^3 \\ & = 798\,278\,69,33 \text{ cm}^3 \\ & \approx 79\,828 \text{ ℓ} \end{aligned}$$

$$\begin{aligned} 1\,000 \text{ cm}^3 &= 1 \text{ litre} \\ \pi &= 3,14 \end{aligned}$$

Mr Pillay has made **two** errors whilst calculating the volume of the old 100 ℓ geyser.

List the two errors and correct them. (4)

- 3.5 Calculate the volume of the new 200 ℓ geyser to the nearest litre. (4)

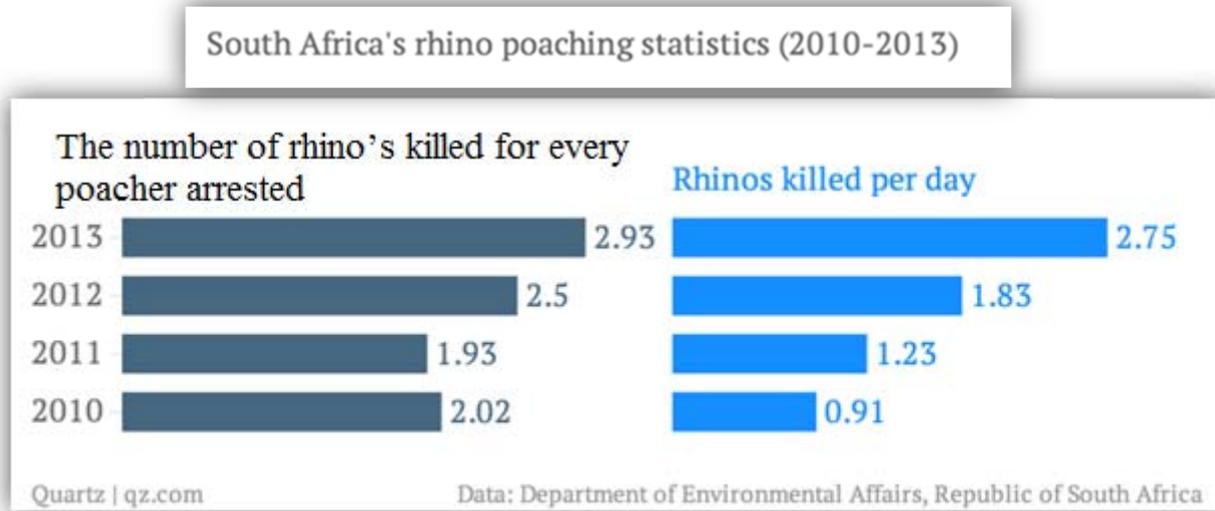
- 3.6 Based on the volume, should Mr Pillay be happy with his new geyser? Give a reason for your answer. (2)

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QUESTION 4

Rhino poaching has gained a lot of media attention over the past few years.

The following graphs appeared in a report issued by South Africa's Department of Environmental Affairs:



GRAPH 1

GRAPH 2

- 4.1 What would the ideal ratio be for Graph 1? Explain your answer. (2)
- 4.2 Which year was the most successful year for poacher arrests? Justify your answer. (2)
- 4.3 Calculate the mean number of rhinos killed per day over the 4 years shown. (3)
- 4.4 4.4.1 By using Graph 2 and the table below, calculate the total number of rhinos that were killed over the 4 years.

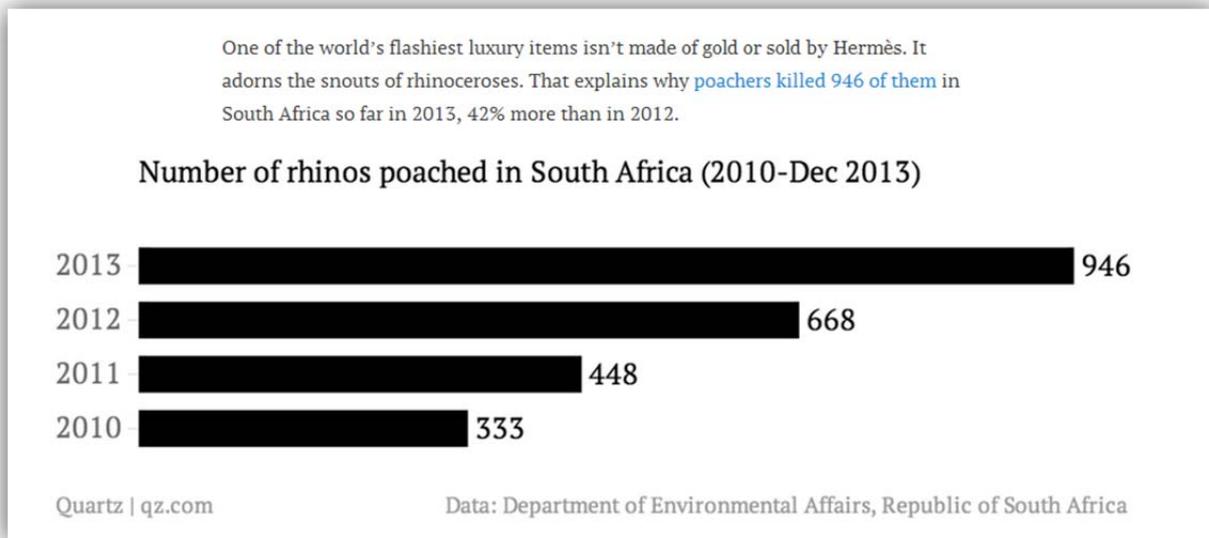
YEAR	NUMBER OF DAYS IN THE YEAR
2013	365
2012	366
2011	365
2010	365

(6)

- 4.4.2 A rhino costs on average \$150 000. With the knowledge that \$1 = R10,61, calculate the value of the rhinos killed from 2010 to 2013. Round off your answer to the nearest million rand. (4)

Another graph appeared in the same media report:

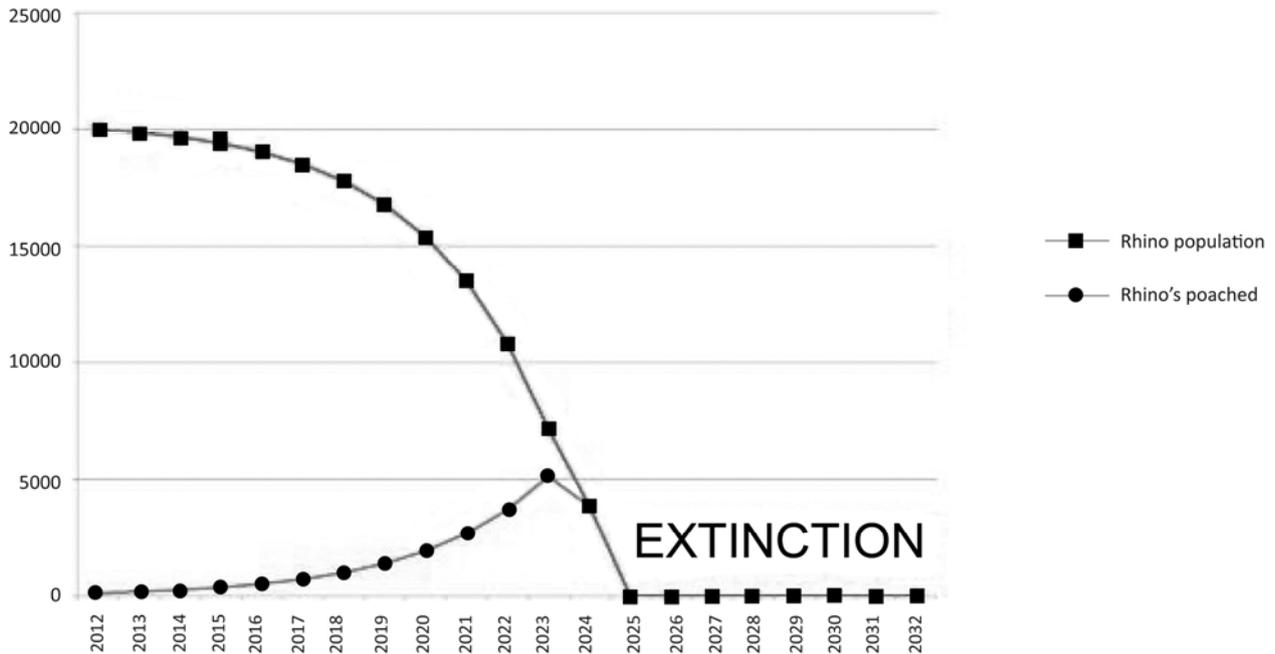
GRAPH 3



- 4.5 Calculate the range of rhinos killed in the past 4 years based on the figures shown in Graph 3. (2)
- 4.6 Why do you think a smaller range would be preferable in the above graph? (2)

Another company chose to represent the sad situation around rhino poaching differently.

GRAPH 4



- 4.7 Would it be correct to assume from the above graph that no rhinos were poached during 2012? Justify your answer. (2)
- 4.8 Estimate what the projected rhino population will be in the year 2021. (2)
- 4.9 Give a possible reason for the decline in the projected number of rhinos poached between 2023 and 2024. (2)
- 4.10 According to this projection, how many years from now do we have until rhinos are completely extinct? (2)

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QUESTION 5

Hannah is very excited because her parents have agreed to help her buy a car. They will pay the monthly repayments but she will be responsible for the petrol and insurance costs.

The picture below shows the car she will be buying.

2014 FIESTA FORD 1.6 TREND 4DR POWERSHIFT

The cost of the car is R215 600,00.

- 5.1 When buying a car, the customer signs a Hire Purchase agreement with the car dealership. The interest rate that her parents are given is 12,5% and they intend to pay the car off over 60 months.

Hannah feels proud because she understands the concept of hire purchase and how simple interest works.

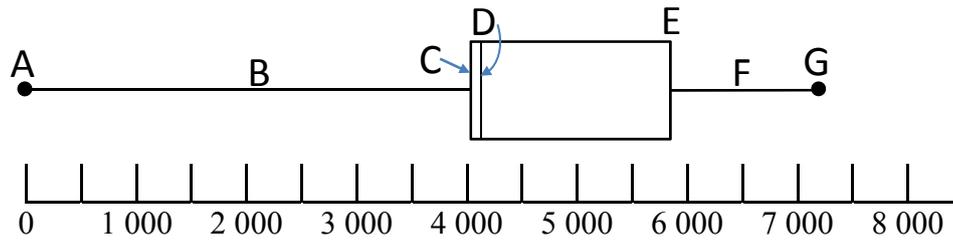
Without the use of a formula, calculate the cost of the car including interest and hence their monthly repayments. Show all working. (7)

- 5.2 Hannah investigates quotes from different insurance companies to find the most affordable insurance premium. **ANNEXURE 4** shows a summary of the quotes she received from the different insurance companies.

5.2.1 Calculate the percentage difference between the highest quote and lowest quote. (3)

5.2.2 Hannah cannot decide which one to choose. Which company would you advise Hannah to choose and why? (2)

5.3 Hannah is curious about the different amounts which the companies (shown on ANNEXURE 4) charge for excess. She summarises the data in a Box and Whisker Plot.



5.3.1 State which letter represents the Upper Quartile. (2)

5.3.2 State which letter represents the Median, and what its value is. (3)

5.3.3 Lines C and D lie very close to each other. By referring to the context, explain what this means. (2)

5.4 Hannah budgets R980 for her monthly petrol costs. If she chooses **1st for women** as her preferred insurance company, calculate the total monthly costs for her car, including the monthly payment to the bank. (3)

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Total: 150 marks