



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2011

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.
 - Seven questions.
 - Appendices A – E.

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. Where necessary round off all answers to two decimal places.
 5. Approved non-programmable calculators may be used in all questions.
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QUESTION 1

Study the advertisement below and answer the questions that follow.



[Sunday Times, 12 December 2010]

- 1.1 Calculate the percentage discount rounded off to one decimal digit. (5)
- 1.2 Mr Xhosa decides to buy this microwave on hire purchase. How much will Mr Xhosa pay for the microwave altogether? (4)
- 1.3 Mrs Xhosa uses her new microwave to roast a chicken. The 700 watt microwave takes 45 minutes to cook the chicken.
 - 1.3.1 Use the information and formula in the table below to calculate how much energy is used to cook the chicken without rounding off your answer.

$E = P \times t$

Where: E = Energy in kilowatts per hour (kWh)
 P = Power in kilowatts
 t = Time in hours
 1 000 watts = 1 kilowatt

(4)

- 1.3.2 Determine the cost of electricity to roast the chicken if the cost per kWh is 93,31 cents. Give your answer in rands and cents. (3)

1.4 Mrs Xhosa wants to buy a new kitchen cabinet on which she can place her new microwave. Mrs Xhosa notices one advertised for R3 999,00. She decides to save until she has enough cash to pay for the kitchen cabinet. She uses her December bonus of R2 900,00 to deposit into her savings account where she is offered 3,5% p.a. interest, compounded monthly.

With the use of the formula below determine if Mrs Xhosa will be able to afford the kitchen cabinet a year later if she adds R960,00 to the saved amount.

$$A = P(1 + i)^n$$


Where $A =$ Saved amount

$P =$ December bonus

$i =$ interest as a decimal

$n =$ number of times the interest is calculated (6)

1.5 The following table can be used to help Mr Xhosa calculate the amount of tax he needs to pay.

		EFFECTIVE DATE 2011.03.01			
normal tax determined according to the statutory rates of tax					
6 STATUTORY RATES OF TAX					
Rates applicable to individuals	Taxable income		Rates of tax		
	R	R	R		R
	0	— 150 000		18%	of every R1
	150 001	— 235 000	27 000 +	25%	of the amount over 150 000
	235 001	— 325 000	48 250 +	30%	of the amount over 235 000
	325 001	— 455 000	75 250 +	35%	of the amount over 325 000
	455 001	— 580 000	120 750 +	38%	of the amount over 455 000
	580 001	and above	168 250 +	40%	of the amount over 580 000
Rebates					
	Primary rebate				R10 755
	Additional rebate (for persons 65 years and older)				R 6 012

- Taxable income refers to the ANNUAL income
- Rebates – A further amount to be deducted from the calculated annual tax

[Source: www.sars.gov.za]

EXAMPLE:

If a 32-year old gentleman earns R156 000,00 a year, his tax will be calculated as follows:

$$\begin{aligned} \text{Tax Payable} &= R27\,000,00 + \left[\frac{25}{100} \times (R156\,000,00 - R150\,000,00) \right] \\ &= R27\,000,00 + R1\,500,00 \\ &= R28\,500,00 \\ \text{Less Rebate} &= R28\,500,00 - R10\,755 \\ \text{Annual Tax} &= R17\,745,00 \end{aligned}$$

With the use of the table and the example above, calculate how much tax Mr Xhosa (who just turned 67 years of age) would pay every year if he earns a gross salary of R120 000,00 a year.

(5)
[27]

QUESTION 2

Your CASS (Continuous Assessment) mark for Mathematical Literacy is made up as follows:

- Any 3 tests 20 marks
- Any 2 short pieces 30 marks
- Any 1 long piece 20 marks
- Preliminary Paper 1 15 marks
- Preliminary Paper 2 15 marks
- TOTAL 100 marks

2.1 DJ wrote 6 tests during the year and achieved the following percentages:

TEST	PERCENTAGE
Test 1 – The Cellphone	?
Test 2 – Vehicle Costs	65%
Test 3 – Oh, What a Garden	23%
Test 4 – Probability and Statistics	76%
Test 5 – Graphs	89%
Test 6 – The Farmyard	62%

2.1.1 Unfortunately DJ lost his first test, but he knew the average for all 6 of his tests was 60%. Calculate the percentage scored for Test 1.

$$Mean = \frac{Total\ of\ all\ tests}{No.\ of\ tests} \tag{5}$$

2.1.2 Since the first test was lost, it cannot be considered for DJ's portfolio. Determine the median of the marks for the last five tests. (2)

2.2 DJ's CASS mark for 2011 was 68%. He wants to get 80% for his final Mathematical Literacy mark at the end of the year. What percentage mark must he get for his November examinations if the CASS mark counts 25% and the November examination marks count 75% towards his final year mark? (6)

[13]

QUESTION 3

- 3.1 The Van Zyl family went to the Kruger National Park for their family holiday. Upon arrival they bought a booklet containing maps and information pertaining to the Kruger National Park.

Consider appendices A, B, C and D – all extracts from their booklet.

- 3.1.1 Using Appendix A, determine the distance by road between Letaba Camp, found in section 1 of the map, and Olifants Camp found in section 2 of the map. (2)

- 3.1.2 According to Appendix B, it takes 3 hours and 45 minutes to travel from Letaba Camp to N'wanetsi Get Out Point. When written in hours, 3 hours and 45 minutes can be written as: (Write down only the letter of the correct answer).

- A 3,45 hours
 B 3,75 hours
 C 3,045 hours
 D 3,075 hours (2)

- 3.1.3 Using Appendix C and D, determine the closing time of the shop at Letaba Camp during the month of July. (2)

- 3.1.4 Whilst having tea one sunny July afternoon at Olifants Camp, the Van Zyl family realise they need to return to Letaba Camp where they will spend the night. They leave Olifants Camp at a quarter past five.

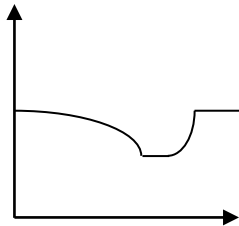
$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

- (a) How long will it take them to get to Letaba camp if they stick to the speed limit of 50 kilometres per hour? Give your answer to the nearest minute. (4)
- (b) By how many minutes will they miss the closing time of Letaba Camp? (2)
- (c) At what speed would Mr Van Zyl have to travel in order to make the closing time of the gate? (3)
- 3.1.5 The Van Zyl family have a map of their own, different from the map shown on Appendix A. Their map shows the distance between Letaba Camp and the Phalaborwa Gate is 42 km. When they measure the actual distance on the map, they measure 5 cm.
- (a) How many centimetres are represented on the road by one centimetre on the map? (3)
- (b) Write the scale of their map in the form 1: (1)

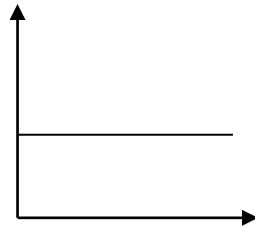
3.2 There are 3 different stages of the Van Zyl's journey as listed below.

- Stage 1 – Pulling off at an inconsistent speed from being stationary.
- Stage 2 – Driving at a constant speed.
- Stage 3 – Slowing down at an inconsistent speed to look at animals, travelling at a slower constant speed and then accelerating to a faster constant speed again.

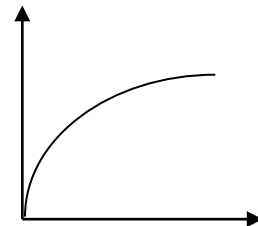
3.2.1 From the graphs drawn below match the 3 stages listed above with the correct graph drawn. Example, stage 1 = graph ?



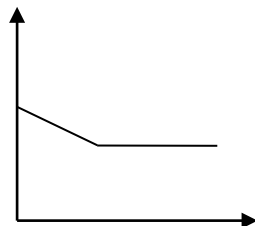
Graph A



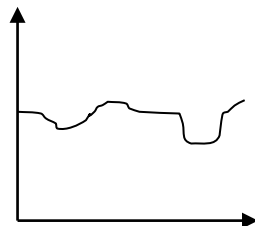
Graph B



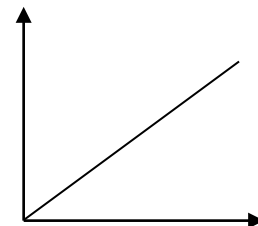
Graph C



Graph D



Graph E



Graph F

(6)

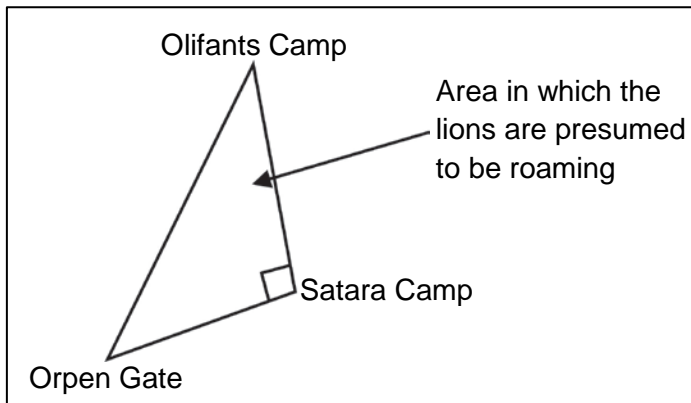
3.2.2 In each of the graphs above, what is represented on the:

- (a) horizontal axis? (1)
- (b) vertical axis? (1)

3.2.3 Sketch a rough graph which illustrates Stage 4, which is when Mr Van Zyl was travelling at a constant speed and suddenly had to stop so that he did not hit an impala (buck) crossing the road. The car stopped for a short while before Mr Van Zyl was able to accelerate at a constant speed and then reaching a constant cruising speed once again. (6)

3.3 The Van Zyl family were told that a pride of lions were roaming in the area between the Orpen Gate, the Olifants Camp and Satara Camp as shown below:

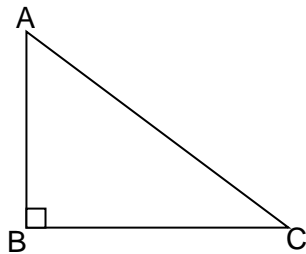
Sketch 1



The angle formed at Satara Camp can be presumed to be 90°. The direct distance between Olifants Camp and Satara Camp is 45 km and the direct distance between Olifants Camp and the Orpen Gate is 60 km.

3.3.1 Using Pythagoras' Theorem as shown below, determine the direct distance (rounded off to the nearest whole kilometre) between Satara Camp and the Orpen Gate.

Pythagoras' Theorem



$$AC^2 = AB^2 + BC^2 \tag{6}$$

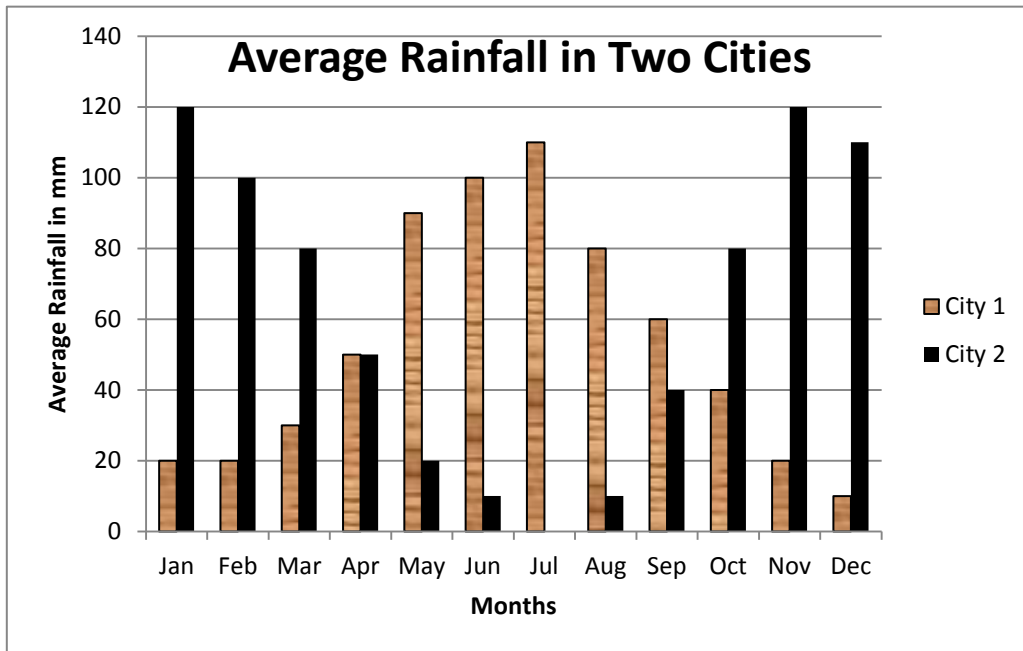
3.3.2 Determine the area in which the pride of lions are presumed to be roaming.

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{perpendicular height} \tag{4}$$

[43]

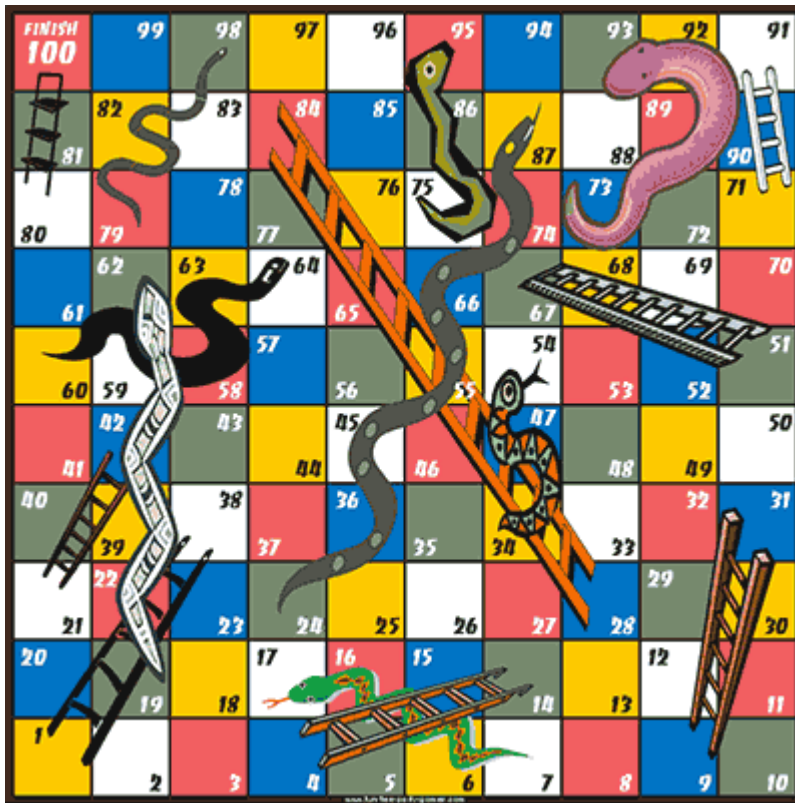
QUESTION 4

4.1 Below is a graph which indicates the average rainfall for two cities in South Africa. All the figures indicated have been rounded to the nearest 10 mm.



- 4.1.1 Do you think that these two cities are close to each other? Give a reason for your answer. (2)
- 4.1.2 Calculate the range of rainfall for City 2 over the twelve month period. (3)
- 4.1.3 Calculate the mean rainfall for City 1 over the winter months (June, July and August). Round off your answer to 2 decimal places. (3)
- 4.1.4 Determine the mode of the rainfall for City 1 for the year. (2)
- 4.1.5 Determine the median rainfall for City 2 for the year. (5)
- 4.1.6 City 1 has an average rainfall of 20 mm for the month of February. Considering that the figure of 20 mm has been rounded to the nearest 10, state the range of rainfall the 20 mm could include. (2)
- 4.1.7 One of the cities reflects a rainfall of 0 mm.
 - (a) Which city reflects this rainfall of 0 mm and during which month is it reflected? (2)
 - (b) Does this necessarily mean that the city gets no rainfall in this month? Explain your answer. (2)

4.2 During a rainy day, a family decide to play a game of 'Snakes and Ladders'. The idea of the game is to start at 1 and end at 100 by rolling either one or two dice. If two six sided dice are used, the player would move the number of spaces which is the sum of both dice. For example: If a player rolls a '2' on the one dice and a '6' on the other dice, the player moves eight spaces forward.



Jimbo is currently on number 23. If he rolls a '5' on the dice, he will land on 28, which means he will climb the ladder to number 84 and in so doing, he will be closer to victory.

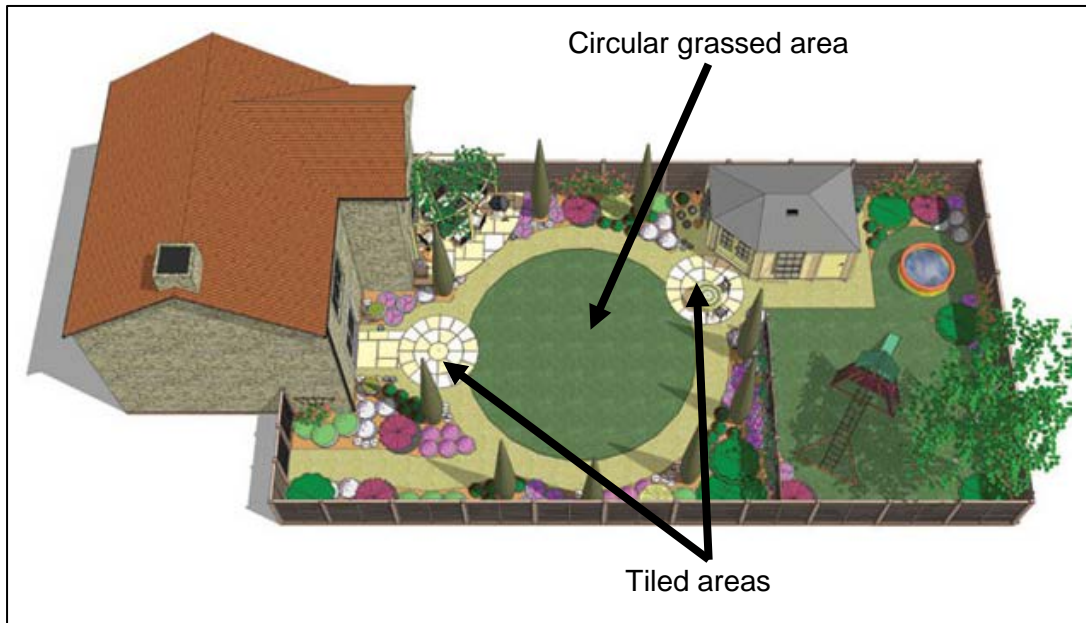
- 4.2.1 If the game was played with one dice, determine the probability of Jimbo rolling a '5' on the dice. (2)
- 4.2.2 If the family were to have been playing with two dice, what would the probability have been of throwing two numbers whose sum would have been 5? Give your answer in its simplest fractional form. (4)
- 4.2.3 When playing with two dice, what is the probability of Jimbo landing on number 37 if he is currently on number 36? Explain your answer. (2)

[29]

QUESTION 5

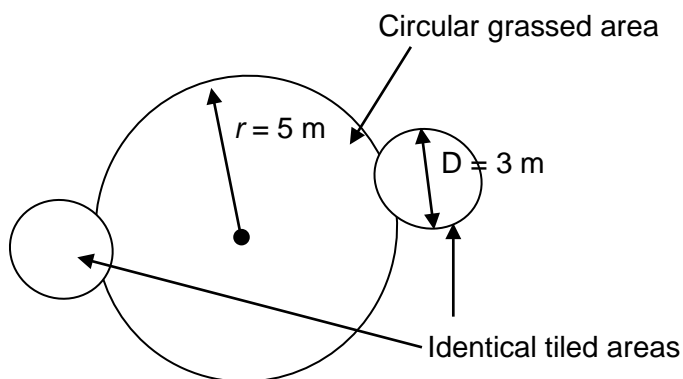
Mr Reddy is a garden landscaper.

- 5.1 Below is a design of one of the gardens he is working on. His responsibility is to calculate the cost of the grass that is needed to grass the circular area in front of a big house.



[Source: <<http://www.gardendesignpro.co.uk>>]

The grassed area and the tiled area are to have the following dimensions: (The diagrams are NOT drawn to scale.)



The radius of the grassed area is 5 metres. The diameter of each of the tiled areas is 3 metres. A twelfthth $\left(\frac{1}{12}\right)$ of each tiled area overlaps the grassed area.

$$Area = \pi \times r^2 \quad \text{Let } \pi = 3,14$$

Determine the cost of the grass needed if a tray of grass, that covers 6 m^2 , costs R89,50. However, the following discounts apply:

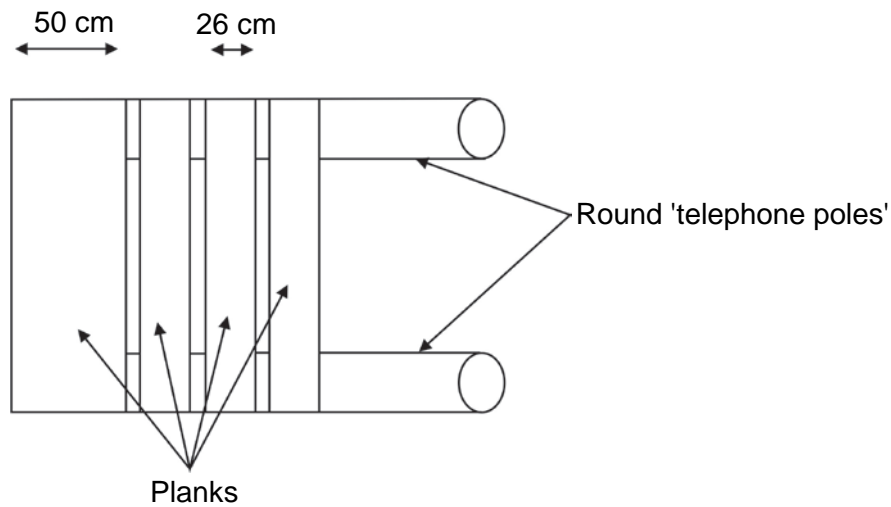
- If one buys less than 6 trays – R89,50 per tray
- If one buys a total of between 5 and 16 trays – R70,40 per tray
- If one buys more than 15 trays – R55,00 per tray

(14)

5.2 In another project, Mr Reddy needs to work out how many planks are needed to build a simple bridge as indicated below with this rough sketch and photograph of a similar bridge:



[Source: <<http://www.gardendesignpro.co.uk>>]



The bridge is to be 4,66 metres in length. It is made by placing two telephone poles (cylindrical in shape) on the ground with rectangular planks placed across them. The two planks on each end are 50 cm wide and each of the other planks in the middle are 26 cm in width. There is a 2 cm gap between each of the planks.

Determine how many planks of width 26 cm are required to build the bridge. Show all your working.

(6)
[20]

QUESTION 6

The following newspaper article refers to the costs that pharmacists may charge customers when they dispense (give) medicine that has been prescribed by a doctor.

Pharmacists relieved as dispensing row has been settled

The Department of Health has published revised dispensing fees for pharmacists, putting to rest a six-year legal battle that has cost the industry more than R30m in legal fees.

The new fees, gazetted on Friday, 19 November 2010 are a major improvement on the R24 maximum originally proposed by the department in January 2004, which pharmacists felt was so low it rendered many of their businesses unviable. That prompted a legal challenge that went all the way to the Constitutional Court. The new regulations set out four price bands for medicines, each with its own maximum fee. These are as follows:

Single Exit Price ('SEP')	Maximum Dispensing Fee Exclusive of VAT
SEP < R75	R6 + 46% of SEP
R75 ≤ SEP < R200	R15.75 + 33% of SEP
R200 ≤ SEP < R700	R51 + 15% of SEP
SEP ≥ R700	R121 + 5% of SEP

The SEP is the price charged by manufacturers, and is set by the department.

[<www.businessday.co.za]

6.1 Study the example completed below and then answer the question which follows.

Example: If the cost of prescribed cough mixture is R85, then a pharmacist may charge the following:

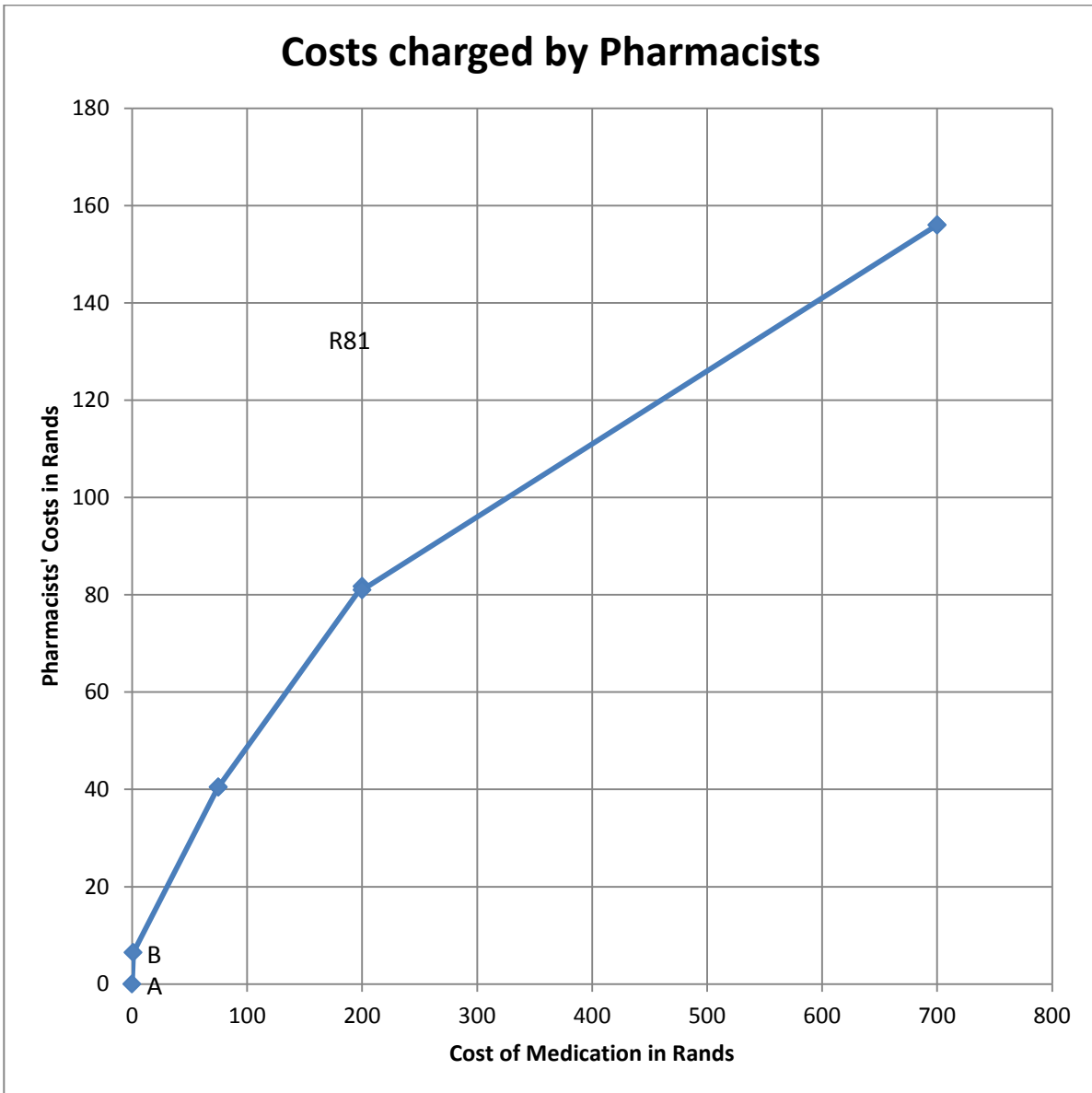
$$\begin{aligned}
 \text{Pharmacist Cost} &= R15,75 + \left(\frac{33}{100} \times R85 \right) \\
 &= R15,75 + R28,05 \\
 &= R43,80 \\
 \text{Total Cost} &= \text{Cost of medication} + \text{Pharmacist Costs} \\
 &= R85 + R43,80 \\
 &= R128,80
 \end{aligned}$$

This means that a customer will pay a total of R128,80 for his medicine.

What would a customer pay in total for prescribed medicine that has a Single Exit Price ('SEP') of R699,99?

(6)

6.2 Below is a graph that illustrates the pharmacists' charges when dispensing medication prescribed by a doctor.



Explain why there is a steep line (AB) drawn at the initial part of the graph.

(2)
[8]

QUESTION 7**Refer to Appendix E.**

- 7.1 The following paragraph has missing values. Do not re-write the entire paragraph but only write the letter and the missing value.

Example: A – 23

1 foot = 12 inches

The chart shows that at age 2 years 95% of boys are less than A inches. At B years 95% of boys are less than 75 inches (about 189 cm), or C feet D inches. (4)

- 7.2 The body mass index (BMI) is a measure of body weight based on a person's weight and height. Though it does not actually measure the percentage of body fat, it is used to estimate a healthy body weight based on a person's height, assuming an average body composition. Due to its ease of measurement and calculation, it is the most widely used diagnostic tool to identify weight problems within a population.

$$BMI = \frac{\text{mass (kg)}}{(\text{height (m)})^2}$$

Calculate the BMI of an 18 year old boy whose weight is at the 95 percentile and whose height is at the 25 percentile. (Round off your answer to 2 decimal places.) (6)

[10]

Total: 150 marks