



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2012

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
 - An Answer Sheet of one 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. Where necessary round off all answers to two decimal places.
 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.
-

QUESTION 1

The following was an advertisement for a home on the Internet.



[<www.property24.com>]

1.1 Estate agents usually work with a table similar to the one below when calculating monthly repayments on a loan amount.

Monthly repayment = (Loan Amount ÷ 1 000) × Factor				
	Interest Rate per Year			
	10,5%	11%	11,5%	12%
Period of repayment (in Years)	Factors			
15	11,05	11,37	11,68	12,00
20	9,98	10,32	10,66	11,01
25	9,44	9,80	10,16	10,53

Using the table above, determine the monthly repayments a client, Gladis, would pay if she buys the advertised house for R290 000. The bank will charge 11,5% interest on the loan over a period of 20 years.

(3)

1.2 Gladis bought the advertised home. However, at the end of the 48th month she could not pay her monthly repayment which was reduced to R2 992,80. Gladis never managed to make up this missed payment. At the end of the loan period she had to pay the outstanding amount (missed payment plus interest of 10,5% compounded monthly).

She attempted to calculate the outstanding amount as follows:

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

$$= R290\,000(1 + 10,5)^{16}$$

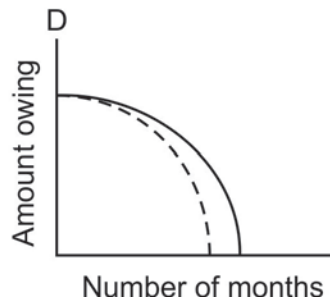
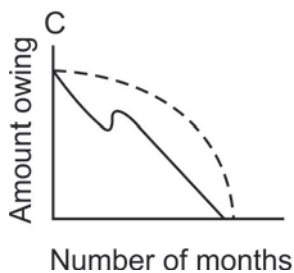
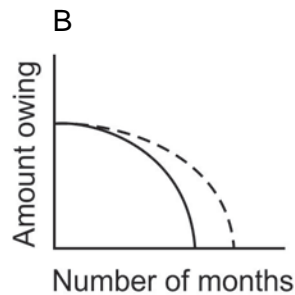
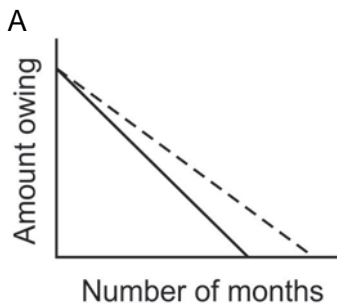
$A = P(1+i)^n$

Where: A = Total amount outstanding
 P = Value of the missed payment
 i = Monthly interest
 n = Number of months

Identify the mistakes she made when substituting into the formula.
 Give a reason why her values used are incorrect.

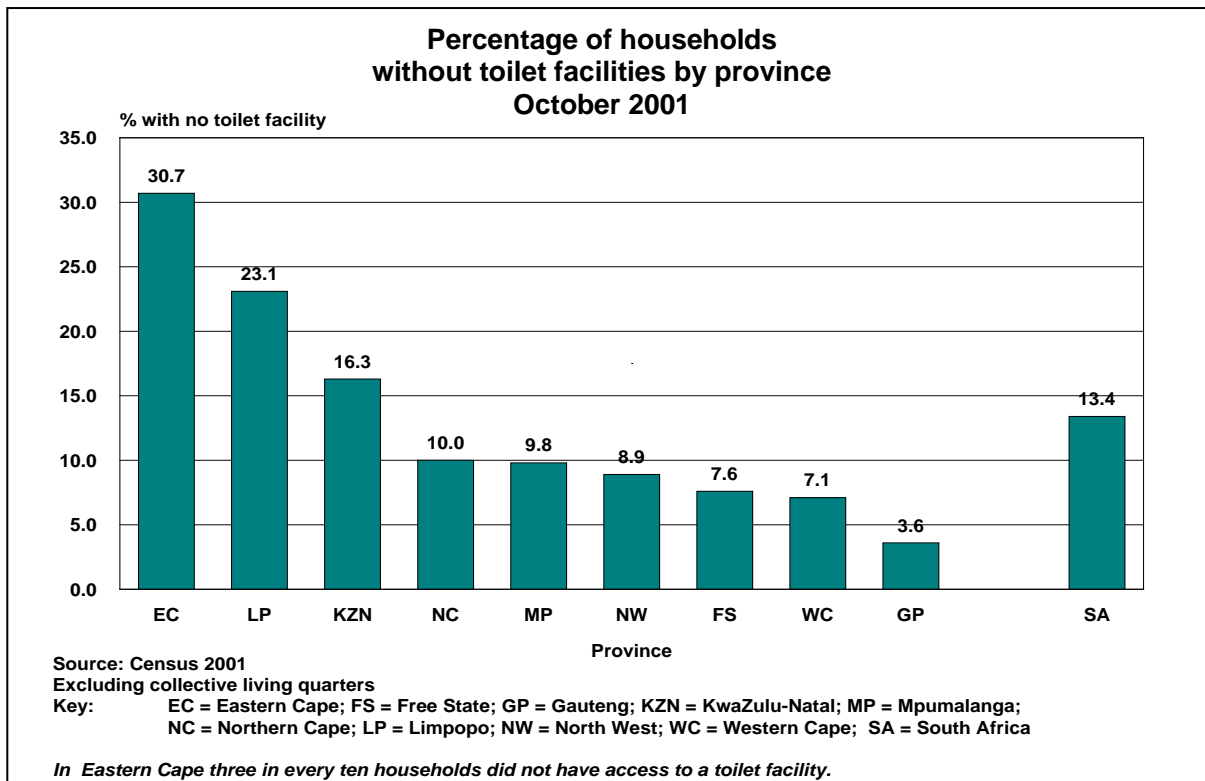
(6)

1.3 If Gladis had not fallen behind on her monthly payments but rather paid a double payment at the end of the 48th month, then the period of repayment of the loan would be reduced. The time in which she could have paid off her loan can best be illustrated by one of the following diagrams. The dotted lines illustrate the loan payment without the double payment, whereas the solid lines illustrate the payments with the double payment. Select the correct diagram which best illustrates this scenario. (Just write A, B, C or D)



(2)

1.4 Fortunately, Gladis' house was built with toilet facilities. However, many households in South Africa do not have toilet facilities. Consider the graph below that illustrates the percentage of households without toilet facilities by province. The survey was done in October 2001 by Census 2001.



In Eastern Cape three in every ten households did not have access to a toilet facility.

[Adapted from: <<http://www.pmg.org.za>>]

1.4.1 In the Western Cape 75 in every 1 000 households did not have access to a toilet facility. Prove that the statement is incorrect. (3)

1.4.2 When asked to calculate the mean (average) number of homes that do not have access to a toilet facility, Thando did the following calculation:

$$\begin{aligned} \text{Mean Average} &= \frac{30,7 + 23,1 + 16,3 + 10,0 + 9,8 + 8,9 + 7,6 + 7,1 + 3,6}{9} \% \\ &= \frac{117,1}{9} \% \\ &= 13,01\% \end{aligned}$$

Thando is confident that he is correct, but to his horror he discovers that Census 2001 recorded a mean (average) of 13,4%. Explain what Thando did incorrectly.

(2)
 [16]


QUESTION 2

The table below shows some facts pertaining to a certain teenager who smokes one pack of 20 cigarettes daily.

	Daily
Number of packs of 20 cigarettes	1
Cost of a pack	R27,50
Nicotine content	

- 2.1 Depending on the type of cigarette, each cigarette contains between 0,6 and 1,4 milligrams of nicotine.
 - 2.1.1 Determine the nicotine content (in kg) in a pack of 20 cigarettes if each cigarette contains the highest amount of nicotine. Give your answer to six decimal places. (4)
 - 2.1.2 What is the possible range (in mg) of nicotine content of a pack of 20 cigarettes? (4)
- 2.2 Despite the fact that all cigarette boxes have a written warning stating that cigarettes can cause death, many teenagers still choose to smoke.

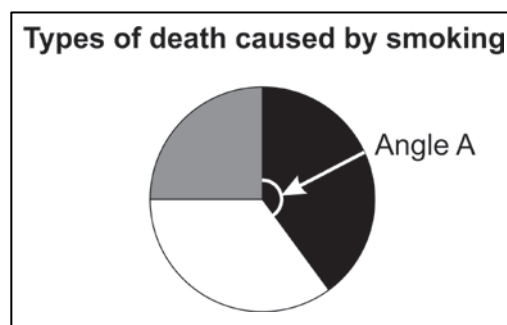
44 000 South Africans die from tobacco-related diseases annually and many more become ill from using tobacco products, such as snuff and hubbly bubbly, and second-hand smoke.



[Adapted from: <<http://www.cansa.org.za>>]

Of these smoking related deaths 25% were due to lung diseases, 35% were due to heart diseases and strokes and the rest of the deaths were due to cancer.

- 2.2.1 Determine the number of cancer related deaths in South Africa as a result of smoking. (3)
- 2.2.2 Below is a pie graph illustrating the number and types of deaths caused by smoking in South Africa.



Determine the size of angle A for the sector that represents the number of cancer-related deaths caused by smoking. (4)

[15]

QUESTION 3

The following 'Weather Outlook' was found in the *Cape Times* on Thursday, 29 December 2011.

National Minimum/Maximum temperatures (in °C)					
Bloemfontein	16	29	Nelspruit	18	23
Durban	19	26	Pietermaritzburg	13	24
East London	18	24	Potchefstroom	15	31
Johannesburg	18	27	Port Elizabeth	16	25
Kimberley	15	31	Pretoria	20	29
Klerksdorp	15	29	Rustenburg	19	29
Mafikeng	15	31	Springbok	13	33
Musina	21	26	Upington	18	35

3.1 Use the 'National Minimum/Maximum temperatures' above to answer the following questions:

3.1.1 Calculate the mean (average) minimum temperatures for the cities listed in the table above. Round off your answer to two decimal places. (5)

3.1.2 Write down the number of cities that have a maximum temperature higher than the modal maximum temperature. (2)

3.2 The Storage Levels on 19 December from 2007 to 2011, which give the capacity of the dams in the Western Cape over the past 5 years, is given below:

Storage Levels on 19 December 2007 – 2011						
	Maximum Capacity (in Million Litres)	2007	2008	2009	2010	2011
Wemmershoek Dam	58 644	82,1%	86,4%	91,5%	90,3%	77,4%
Steenbras Lower Dam	33 517	89,0%	87,5%	87,9%	59,4%	74,6%
Steenbras Upper Dam	31 767	103,3%	90,2%	86,5%	99,6%	95,7%
Voëlvlei Dam	164 122	94,8%	93,4%	92,0%	91,9%	79,1%
Theewaterskloof Dam	480 250	99,7%	97,4%	96,8%	84,4%	77,2%
Berg River Dam	130 000	–	96,0%	97,1%	90,1%	91,3%
Total	898 300					

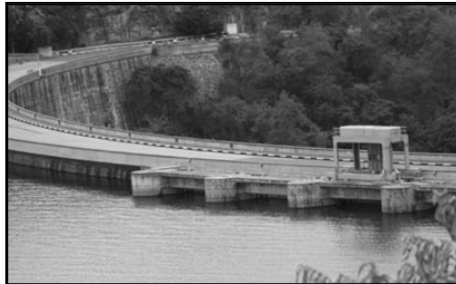
3.2.1 Show that the Steenbras Lower Dam contained more water than the Steenbras Upper Dam in 2008. (6)

3.2.2 Which picture below best illustrates the Steenbras Upper Dam on 19 December 2007? Explain your choice of picture. (2)

Picture A



Picture B



Picture C



3.3 The table below shows the water tariffs of a particular municipality during 2007.

Category	Water Used	Cost (in cents) per Kilolitre (kℓ)
A	From 0 to 6 kℓ	0,00
B	More than 6 kℓ to 15 kℓ	605,62
C	More than 15 kℓ to 20 kℓ	660,05
D	More than 20 kℓ to 40 kℓ	720,06
E	More than 40 kℓ	750,03

The costs shown above exclude 14% VAT.

Example: The cost of using 9 kℓ of water in one particular month can be calculated as follows:

Category	Water Used	Cost (in cents) per Kilolitre (kℓ)	Number of kilolitres (kℓ) used	Total Cost
A	From 0 to 6 kℓ	0.00	6	0,00
B	More than 6 kℓ to 15 kℓ	605,62	3	1 816,86c
C	More than 15 kℓ to 20 kℓ	660,05	0	0,00
D	More than 20 kℓ to 40 kℓ	720,06	0	0,00
E	More than 40 kℓ	750,03	0	0,00
Total Kilolitres used and cost (excluding VAT)				1 816,86c
			VAT	254,3604c
Total Owing (in cents)				2 071,2204c
Total Owing (in Rands and cents)				R20,71

Use the table and example above to determine the total cost (in Rand and cents and inclusive of VAT) for using 24 kℓ of water in one particular month. **Answer this question on the Answer Sheet provided.**

(8)
[23]

QUESTION 4

The Buthelezi family have decided to travel from South Africa to Botswana. The map below shows a portion of Botswana.



4.1 Unfortunately the map does not show a scale. However, Mrs Buthelezi knows that the direct shortest distance (as the crow flies) between Maun and Serowe is 433 km. Measure the direct shortest distance (along the line) between Maun and Serowe on the map. Determine, showing all calculations, the scale (to the nearest million) of the map in the form 1: ... (5)

4.2 Use the answer obtained in Question 4.1 to determine the direct shortest distance (to the nearest km) between Maun and Kanye. (4)

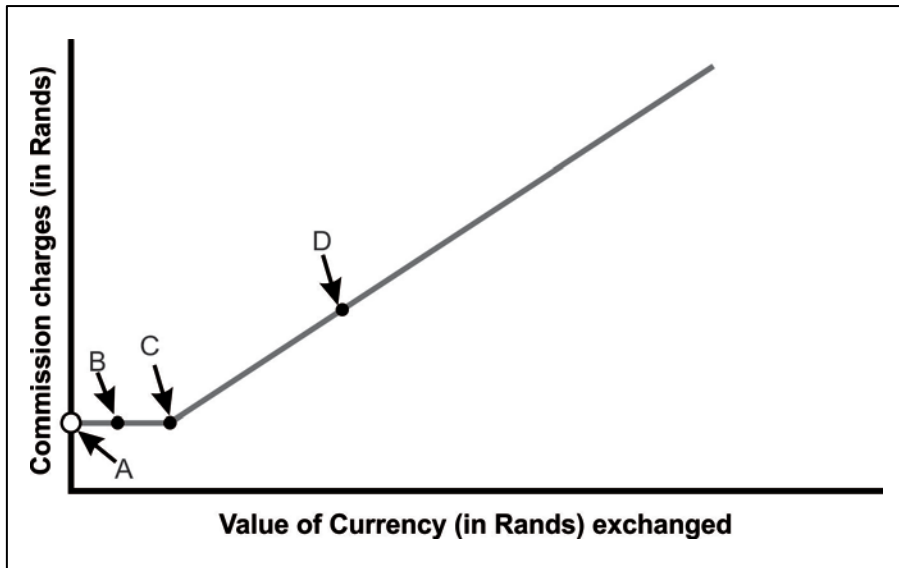
4.3 Mr and Mrs Buthelezi have seven children. Mr Buthelezi determined that each of the nine family members require 75 Botswana Pula (BWP) to spend daily whilst in Botswana. They intend spending 9 days in Botswana.

At the time of going to the bank, Mr Buthelezi was given the following information:

Quotations on the basis of Foreign Currency per R1		
Botswana Pula (BWP)	Bank Buying at 0,9723	Bank Selling at 0,9057


Use the exchange rate above to determine the total amount (in Rands) that the family will need in order to purchase the required amount of Botswana Pula. (6)

4.4 At the bank, Mr Buthelezi discovered that there are commission charges when exchanging currency. The bank charges 1,85% commission on the amount to be exchanged with a minimum charge of R57,50. The graph below illustrates the structure of the bank's commission.



- 4.4.1 Why is there an open circle on the graph at point A? (2)
- 4.4.2 Explain why the part of the graph between point A and point C is represented by a horizontal line. (2)
- 4.4.3 Give the commission charges at point B. (1)
- 4.4.4 Why is the line from point C through point D represented by a straight line? (2)
- 4.4.5 Show that the amount exchanged at point D is R8 500 if the commission charged is R157,25. (3)

4.5 Whilst trying to book bus tickets to Gaborone, Mr Buthelezi goes onto the Internet where he logged onto <www.intercape.co.za> and obtained bus details as follows:



PRICES ARE QUOTED IN SOUTH AFRICAN RAND
 What are 'Saver', 'Flexi' and 'Full Flexi'? Click here to find out

STEP 1 **STEP 2** **STEP 3** **STEP 4**

Depart From JOHANNESBURG - Intercapc Office, Park City Transit Centre, Johannesburg Station
 To GABORONE - Intercapc Office, Kudu Shell Service Station, Queens Road

<<< Previous Four Days Next Four Days >>>

From/To	Depart	Arrive	Full Flexi	Flexi	Saver	Notes
			What do these mean?			
Johannesburg To Gaborone <i>Route: Mainliner PTA - GBE</i>	Wed 04 Jul 2012 14:30pm ZA	Wed 04 Jul 2012 21:10pm BW	<input type="checkbox"/> 320.00	<input type="checkbox"/> 270.00	<input type="checkbox"/> 230.00	Direct Route passport Needed.
Johannesburg To Gaborone <i>Route: Mainliner PTA - GBE</i>	Thu 05 Jul 2012 14:30pm ZA	Thu 05 Jul 2012 21:10pm BW	<input type="checkbox"/> 320.00	<input type="checkbox"/> 270.00	<input type="checkbox"/> 250.00	Direct Route passport Needed.
Johannesburg To Gaborone <i>Route: Mainliner PTA - GBE</i>	Fri 06 Jul 2012 14:30pm ZA	Fri 06 Jul 2012 21:10pm BW	<input type="checkbox"/> 320.00	<input type="checkbox"/> 270.00	<input type="checkbox"/> 250.00	Direct Route passport Needed.
Johannesburg To Gaborone <i>Route: Mainliner PTA - GBE</i>	Sat 07 Jul 2012 14:30pm ZA	Sat 07 Jul 2012 21:10pm BW	<input type="checkbox"/> 320.00	<input type="checkbox"/> 270.00	<input type="checkbox"/> 250.00	Direct Route passport Needed.

<<< Previous Four Days Next Four Days >>>

Click HERE for Flexi & Saver Rules.
PRICES ARE QUOTED IN SOUTH AFRICAN RAND

Mr Buthelezi decided to book the cheapest fare (Saver) possible. The Buthelezi family have 3 children under the age of 10 who pay 50% of the adult price and one child under the age of 3 who pays 25% of the adult price. The family needs to depart Johannesburg on Friday 6th July. Determine the total cost if the prices shown are for the adults. (7)

4.6 The following information refers to the passengers that were on the same bus as the Buthelezis:

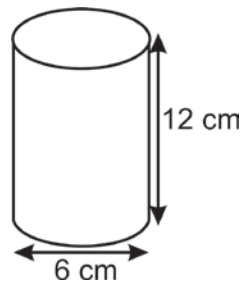
	Adults	Children from the ages of 3 to 9 years	Children under the age of 3 years	Total
Males	21	6	A	B
Females	C	D	E	16
Total	26	F	7	45

4.6.1 Write down the missing values A to F. (6)

4.6.2 What is the probability that any passenger chosen at random will be:

- (a) a female? (Write as a common fraction) (2)
- (b) an adult male? (Write as a decimal, rounded to 2 decimal places) (3)
- (c) a female child under the age of 3 years? (Write as a percentage, rounded off to 1 decimal place) (3)

- 4.7 Cool drinks are served to the passengers on the bus. The drinks are served in plastic cylindrical cups that are 6 cm in diameter and 12 cm high.



In order not to spill, cups are only $\frac{3}{4}$ filled. On average each passenger drinks 3 cups of cool drink on the trip between Johannesburg and Gaborone. The cool drinks are poured from 2-litre bottles into the cups. Determine how many 2-litre cool drink bottles need to be bought if the bus has capacity for 45 passengers. (10)

The following formula and information may be required:

$$\text{Volume of a cylinder} = \pi \times r^2 \times h$$

r = radius

h = height of cylinder

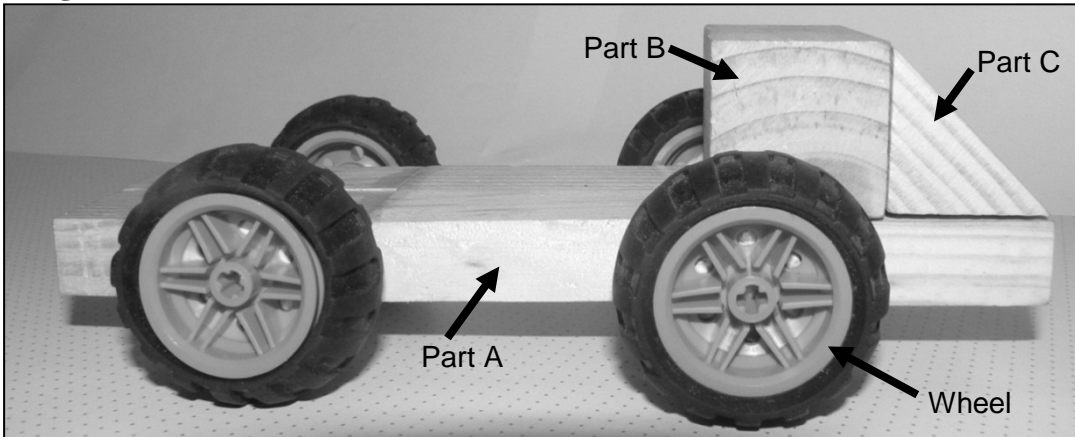
Let $\pi = 3,14$

$$1\ 000\ \text{cm}^3 = 1\ \text{litre}$$

[56]

QUESTION 5

Diagram 1



Part A – rectangular block of wood (rectangular prism)

Part B – rectangular block of wood (rectangular prism)

Part C – triangular block of wood (triangular prism)

Diagram 2

Part B and Part C are both on top of Part A.

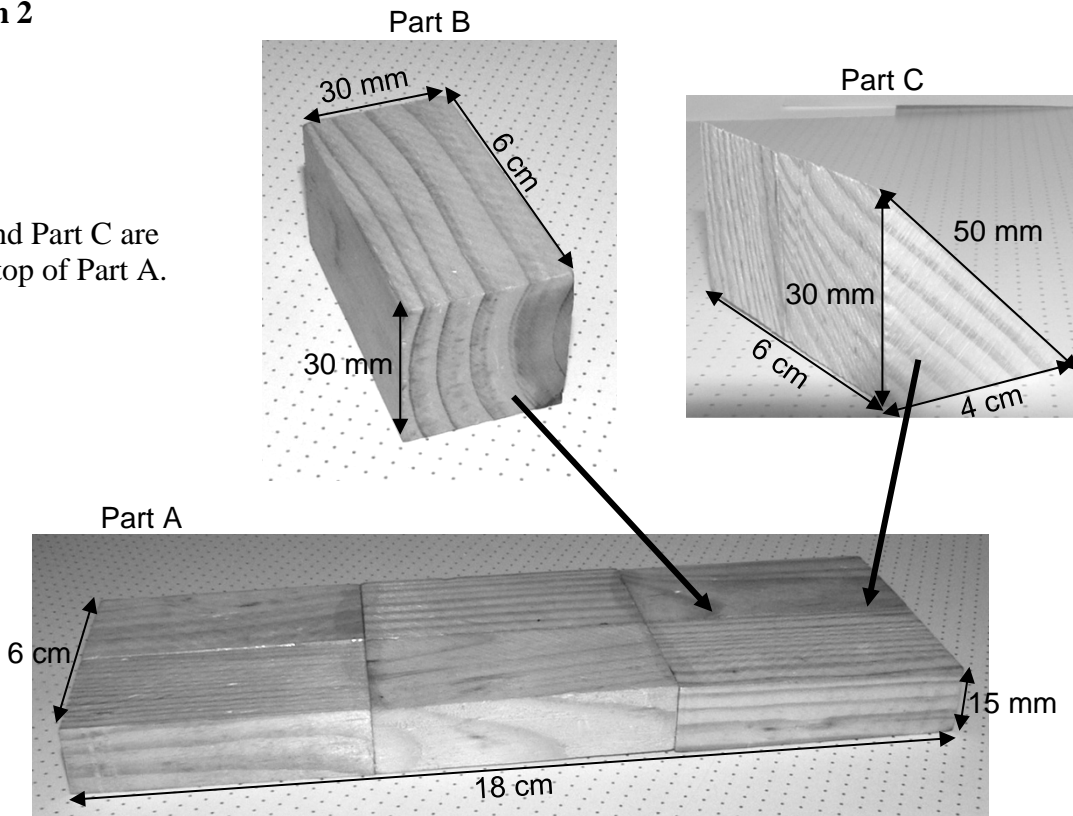
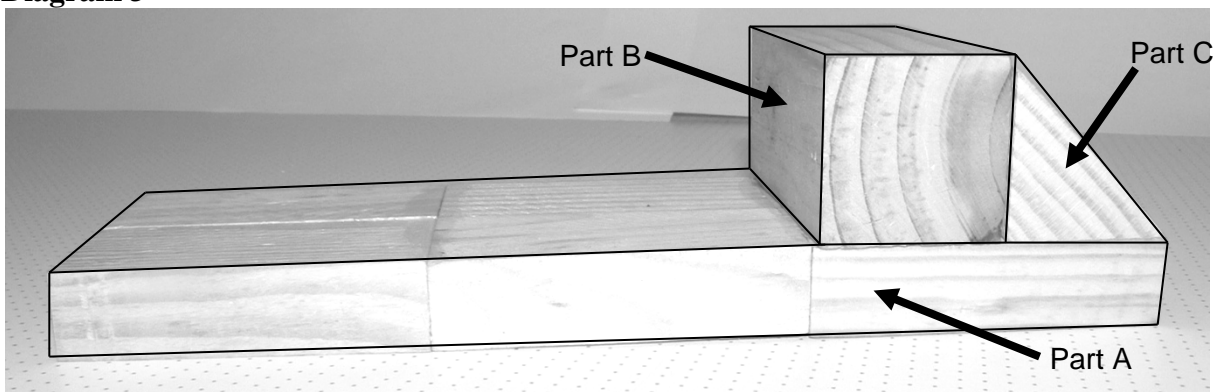


Diagram 3



Bongani and Thabiso need to raise funds for a soccer tour. They decided to make and sell wooden toy trucks to sell at a Saturday Flea Market. The truck will look as shown in Diagram 1 on page 12.

5.1 Part B and Part C are glued to Part A and the wheels are not yet attached.

5.1.1 Calculate the surface area (in mm^2) of Part A that must be painted (after Part B and C are glued to Part A). You may need to use the following formula:

Area of a rectangle = length \times breadth

(8)

5.1.2 Bongani says that the surface area of Part C that needs to be painted is 420 cm^2 . Verify, with calculations, whether his statement is correct or not. You may need to use the following formulae:

Area of a rectangle = length \times breadth Area of a triangle = $\frac{1}{2} \times$ base \times perpendicular height

(6)

5.1.3 Given that the area of Part B that needs to be painted is $5\,400 \text{ mm}^2$, calculate the total area (in mm^2) of Parts A, B and C that needs to be painted.

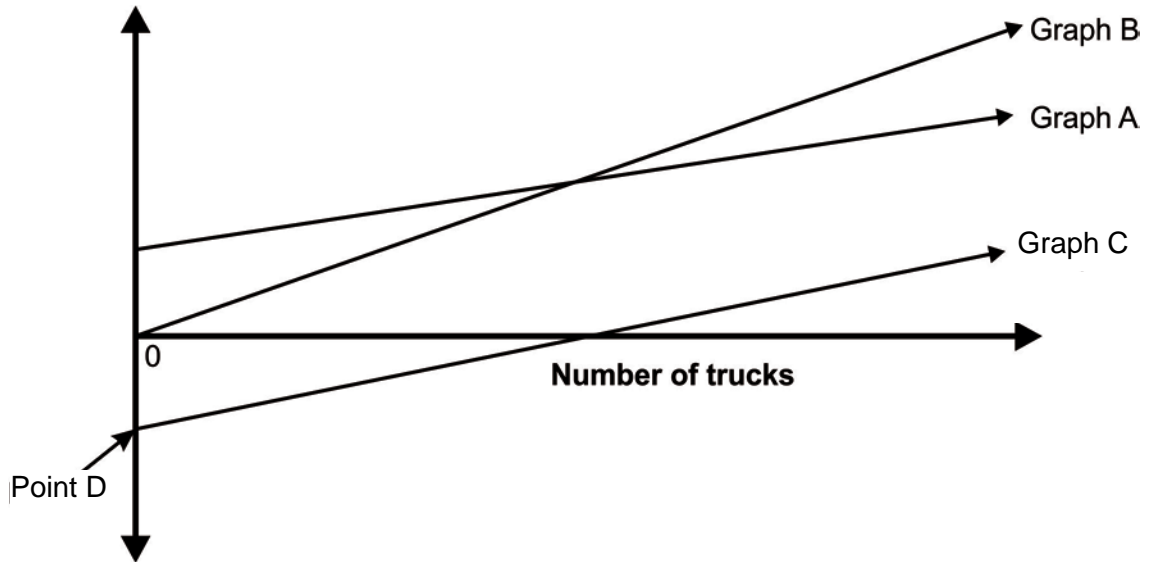
(2)

5.1.4 At a hardware store, Thabiso is told that one litre of paint covers 5 m^2 . He buys 5 litres of paint. Show, by means of calculations, whether he has enough paint to paint 700 trucks, (as shown in Diagram 3 on page 12), each with one coat of paint.

(5)

5.2 Each toy truck costs R8,00 to make. The boys decide to sell their trucks at R20,00 each at a Flea Market each Saturday. The organisers of the Flea Market charge the boys R180 each Saturday for setting up a stall.

The graph below illustrates the income, expense and profit for the making and the selling of toy trucks each Saturday:



5.2.1 If the horizontal axes is labelled as 'Number of Trucks', give a suitable label for the vertical axis. (1)

5.2.2 Complete each of the following statements:

- (a) Graph A represents ... (2)
- (b) Graph B represents ... (2)
- (c) Graph C represents ... (2)
- (d) Point D intercepts (cuts) the vertical axis at ... (2)

5.2.3 Construct a formula for:

- (a) Calculating the income (I) received from selling a number of toy trucks. (Let 't' represent the number of trucks.) (2)
- (b) Calculating the expenses (E) of making a number of toy trucks. (Let 't' represent the number of trucks.) (2)

5.2.4 Use the formulae obtained in Question 5.2.3, or otherwise, to determine the number of trucks the boys need to sell in order to break even on a Saturday. (4)

5.2.5 Calculate the profit the boys would make if they sold 16 trucks on a particular Saturday. (2)

[40]

Total: 150 marks