Newington College

2004

TRIAL HSC EXAMINATION

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – $2\frac{1}{2}$ hours
- Write using black or blue pen
- Board-approved calculators may be used
- A formulae sheet is provided at the back of this paper

Total marks: 100

Section I Pages 1 – 7

22 marks

- Attempt Questions 1–22
- Allow about 30 minutes for this section

Section II Pages 8 – 18

78 marks

- Attempt Questions 1–22
- Allow about 2 hours for this section

Student Number:.....

Section 1 (General Mathematics)

Total marks (22)
Attempt questions 1 –22
Allow about 30 minutes for this part

Select the alternative A, B, C, or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

	A	B	C	D
1				
2				
3				
4				
5				
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7				
8				
9				
10				
11				

	A	B	C	D
12				
13				
14				
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16				
17				
18				
19				
20				
21				
22				

Please remove from Question paper.

NEWINGTON COLLEGE H.S.C. GENERAL MATHEMATICS

SECTION ONE

- **22 marks.**
- **Attempt Questions 1-22.**
- **Allow about 30 minutes for this section.**
- **Use the multiple choice answer sheet supplied.**

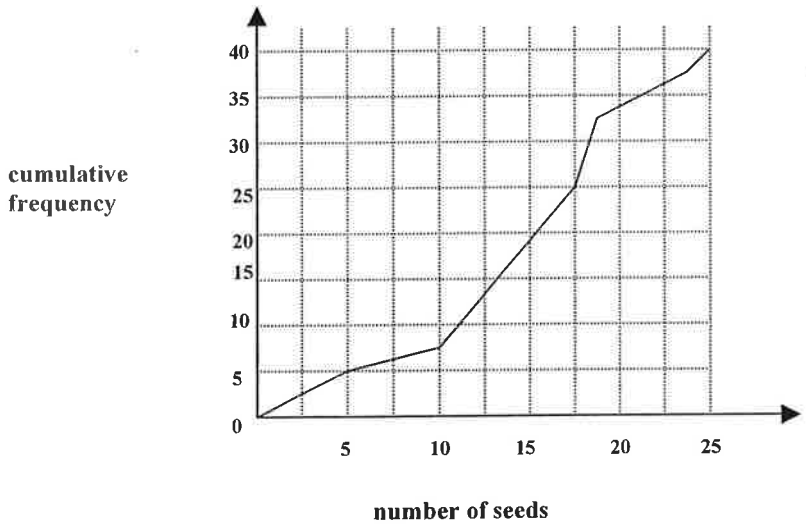
1 A survey was conducted across Sydney of people's smoking habits. The following table were the results of smokers and non-smokers across both genders.

	FEMALE	MALE	TOTAL
SMOKERS	1526	2425	3951
NON-SMOKERS	3942	5106	9048
TOTAL	5468	7531	12999

The percentage of non-smokers in this survey who are men is-

(A) 39.3 (B) 43.6 (C) 56.4 (D) 67.8

2 The ogive plotted below shows the number of seeds found in each of 40 oranges.



The median number of seeds in oranges is-

(A) 12 (B) 16 (C) 18 (D) 40

Q3 ... Page 2

3 Brian measures a length of wood with a tape measure marked in centimetres. He writes down the length as 83cm. The actual length of the wood lies between

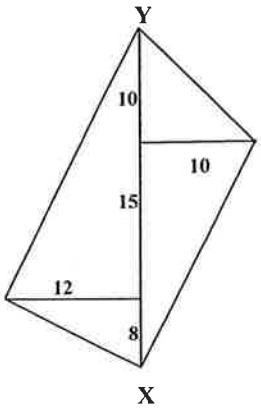
(A) 81 *cm* to 85 *cm*

(B) 82.55 *cm* to 83.55 *cm*

(C) 82 *cm* to 84 *cm*

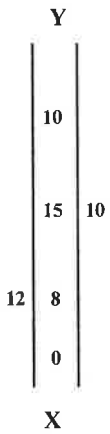
(D) 82.5 *cm* to 83.5 *cm*

4 This is a plan of a local park, with distances shown in metres.

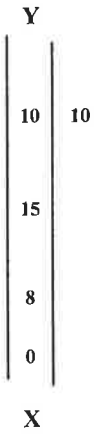


The land is surveyed. The notebook entries in the traverse survey by the surveyor should appear as

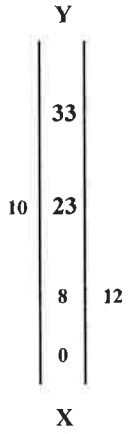
(A)



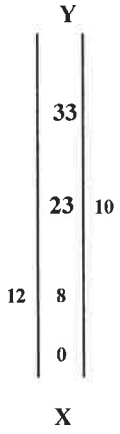
(B)



(C)



(D)



5 The formula $r = \sqrt[3]{\frac{3V}{4\pi}}$ is used to determine the radius (r) of a sphere if the volume (V) is known. A metal spherical ball-bearing has a volume of 95cm. The diameter of the sphere, correct to 1 decimal place is

(A) 2.8cm (B) 5.7cm (C) 6.1cm (D) 12.2cm

Q6 ... Page 3

6 The table shows monthly payments for each *$1000* borrowed.

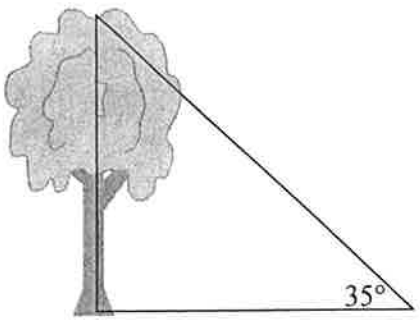
INTEREST RATE		PERIOD OF LOAN			
(% p.a.)	5 years	*10* years	15 years	20years	25 years
5	$18.87	*$10.61*	$7.91	*$6.60*	$5.85
6	$19.33	*$11.10*	$8.44	*$7.10*	$6.44
7	*$19.80*	$11.61	*$9.00*	$7.75	*$7.07*
8	*$20.28*	$12.13	$9.56	$8.36	$7.72
9	*$20.76*	$12.67	*$10.14*	*$9.00*	$8.39
10	$21.25	$13.22	*$10.75*	$9.65	*$9.10*
11	$21.74	$13.78	$11.37	*$10.32*	*$9.80*
12	$22.24	$14.35	*$12.00*	*$11.01*	*$10.53*
13	$22.75	$14.93	$12.65	$11.72	$11.28

Martin borrows $150 000 to buy a house at 8% p.a. over 25 years.

Use the information in the table to calculate how much Martin pays in total to repay this loan.

(A) 2316 (B) 6228 (C) 347400 (D) 9342000

7 Cato wishes to calculate the height of a tree. He measured out the distance on level ground from the base of the tree, and from that position determined the angle of elevation to the top of the tree to be $35°$.



20 m

Not to scale

The height of the tree maybe calculated using

(A) $20\tan 35°$ (B) $\dfrac{\cos 35°}{20}$ (C) $\dfrac{\tan 35°}{20}$ (D) $20\sin 35°$

Q8 ... Page 4

8 An Olympic cyclist has consistently won 65% of the races in which he competes. If he competes in a further 40 races we would expect him to win

(A) 14 (B) 20 (C) 26 (D) 40

9 A debating team consisting of 5 members is asked to enter any two of the members into a regional competition. How many possible selections are there?

(A) 5 (B) 9 (C) 20 (D) 25

10 The solution to the equation $\frac{3p-7}{2}=10$ is

(A) -9 (B) -2 (C) 2 (D) 9

11 Sonia has a taxable income of $45 000. Use the table to calculate the tax payable on Sonia's income.

Taxable Income	Tax Payable
$0 - $5500	Nil
$5501- $21 *200*	Nil plus *20* cents for each $1 over *$5500*
$21 *201-* $39 *400*	*$3140* plus *A* for each $1 over $21 *200*
$39401 - $54 *200*	$9146 plus 44 cents for each $1 over $39 *400*
Over $54 *200*	$15 658 plus 48 cents for each $1 over $54 *200*

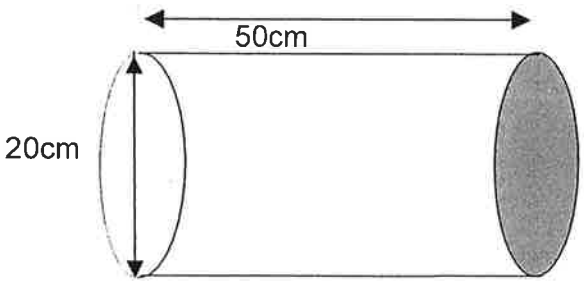
(A) $2464 (B) $11 610 (C) $26 482 (D) $207146

12 Juanitta bought 700 NAB shares at a cost of $5.50 each. If she receives a dividend of 49 cents per share, her dividend yield expressed as a percentage, correct to 1 decimal place, will be

(A) 0.089% (B) 0.89% (C) 8.9% (D) 89%

Q13 ... Page 5

13 A hollow cylinder has no top, but does have a base attached. Benjamin cuts through the sides parallel to the base at a distance of 50centimetres.



An expression for the surface area, in square centimetres, with the base attached is given by

(A) 600π (B) 1000π (C) 1100π (D) 1400π

14 A scientist calculates the volume of an insect as $0.000\ 000\ 018\,m^3$. If the volume was expressed in scientific notation, it would be

(A) 0.18×10^{-7} (B) 1.8×10^{-7} (C) 1.8×10^{-8} (D) 18×10^{-9}

15 Indico's class sat for examinations. Here are the results.

SUBJECT	CLASS MEAN	CLASS STANDARD DEVIATION	INDICO'S MARK
ENGLISH	68	7	60
GEOGRAPHY	78	15	62
MATHEMATICS	55	10	49
PHYSICS	70	9	52

In which subject did Indico do the best in when comparing her results to the rest of the class?

(A) English (B) Geography (C) Physics (D) Mathematics

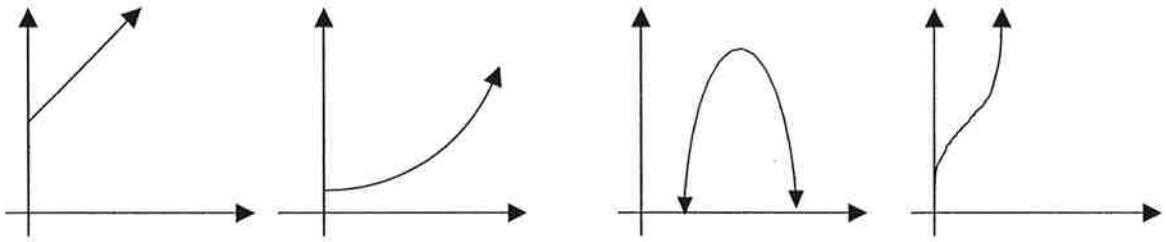
Q16 ... Page 6

16 Jonathan invests \$2500 in the Bank of N.S.W. and leaves the amount to compound monthly for 3 years. The interest rate he obtains from the bank is 12% per annum.

The value of his investment at the end of the 3-year period is given by

(A) $2500(1.12)^{36}$ (B) $2500(1.01)^{36}$ (C) $2500(1.12)^{3}$ (D) $2500(1.01)^{3}$

17 Which of the following represents a quadratic function?



(A) (B) (C) (D)

18 When the expression $3x^2(4-x)+x(x-2)$ is expanded and simplified it becomes

(A) $13x^2+3x^3-2x$ (B) $12x^2-2x^3-2x^2$

(C) $13x^2-3x^3-2x$ (D) $12x^2-3x^2+2x$

19 Two coins are tossed 40 times. The results are tabulated below.

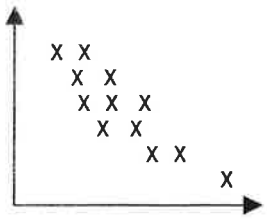
RESULT	FREQUENCY
HH	9
HT	12
TH	8
TT	11

The relative frequency obtained for two heads is

(A) 22.5% (B) 27.5% (C) 31% (D) 50%

Q20 ... Page 7

20 Which correlation value would best represent the scatterplot below?

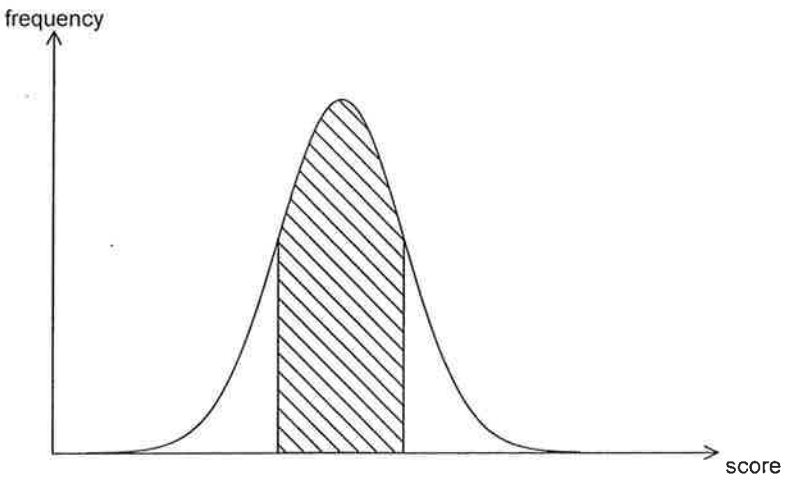


(A) -0.8 (B) -0.3 (C) 0.3 (D) 0.8

21 It is known that 1 degree of difference in longitude on the Earth's surface equates to 4 minutes difference in time. Ignoring time zones the time difference between Parramatta ($34°S, 151°E$) and Margaret River ($32°S, 116°E$) is

(A) 1hr 30min (B) 2hours (C) 2hr 20min (D) 3hours

22 The frequency graph for a large number of people for a mathematics exam is shown, as a normal distribution. The mean is 58 and the standard deviation is 11. Between which scores will approximately 95% of the marks lie?



(A) 47 - 69 (B) 36 - 80 (C) 25 - 91 (D) 14 - 98

END OF SECTION ONE

Section Two ... Page 8

SECTION TWO

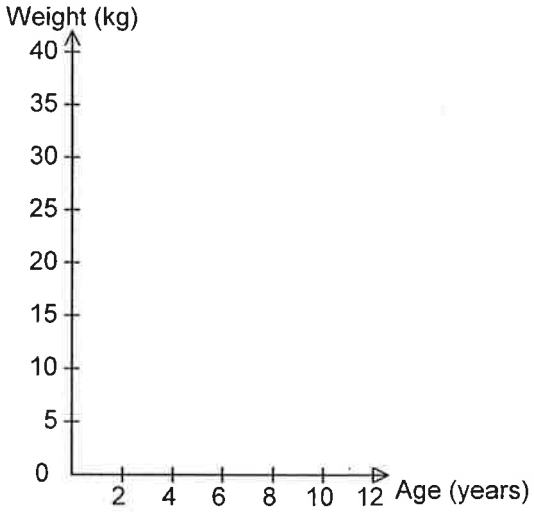
- **78 marks**
- **Attempt Questions 23 to 28**

QUESTION 23 (13 marks) **Use a separate writing booklet.** **Marks**

(a) In a normal working week David works 35 hours. When he works 7 hours overtime at time-and-a-half he earns a total of $528.71 for the week. How much is he normally paid per hour? **2**

(b) The table below shows a relationship between boy's ages and weights from the ages of 1 year to 12 years.

AGE (YEARS)	WEIGHT (KG)
1	10
2	12
3	16
4	16
5	19
6	21
7	26
8	23
9	26
9	30
10	30
10	34
11	33
12	40



(i) On the graph sheet supplied on **page 19**, draw the scatterplot of the data supplied. **2**

(ii) On your graph draw a line of best fit. **1**

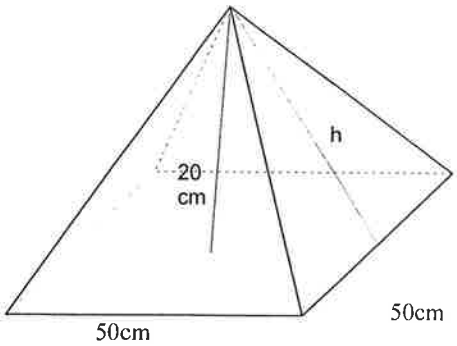
(iii) From your gragh find the equation of the line of best fit. **2**

(iv) Use your equation to predict the weight of a 17 year old. **1**

Question 23 continued on next page.

Question 23 (continued) **Marks**

(c) Samantha made a silk-covered lampshade in the shape of a square-based pyramid, as shown.



The height of the lampshade is 20cm.

(i) Find the value of **h** to the nearest whole centimetre. **1**

(ii) Find how much material (in square metres) is needed to make the lampshade. Remember there is no base to the lampshade. **2**

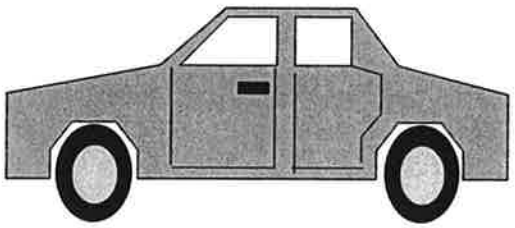
(d) Consider the letters of the word **GUITARS.** If 4 letters are chosen at random, without replacement,

(i) How many possible arrangements are there if the letters chosen begin with a vowel? **1**

(ii) What is the probability that the arrangement chosen begins with a vowel? **1**

QUESTION 24 (13 marks) **Use a separate writing booklet.**

(a) A factory makes "mag" wheels for cars. The costs to produce the wheels have been estimated to include a fixed cost of $10 000 for equipment and wages and also $70 for raw materials per wheel. The wheels are sold for $120 each.



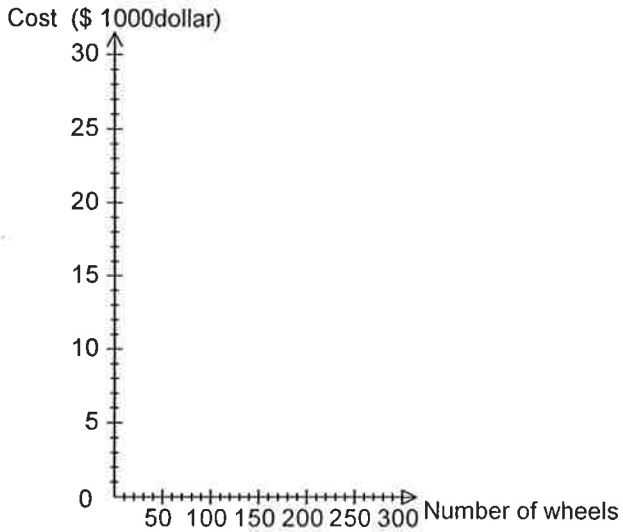
Question 24 continued on next page

QUESTION 24 (continued) **Marks**

Using the answer sheet supplied on **page 21** complete the following question.

(i) Write an equation to represent the cost to the company of producing the "mag" wheels. Let **C** represent the cost to the company and **n** represent the number of wheels produced. **1**

(ii) Write an equation to represent the income received by the company due to the sales of the "mag" wheels. Let **C** represent the income received and let **n** represent the number of "mag" wheels sold. **1**



(iii) Graph both of your equations from part (i) and (ii) onto the axes. **2**

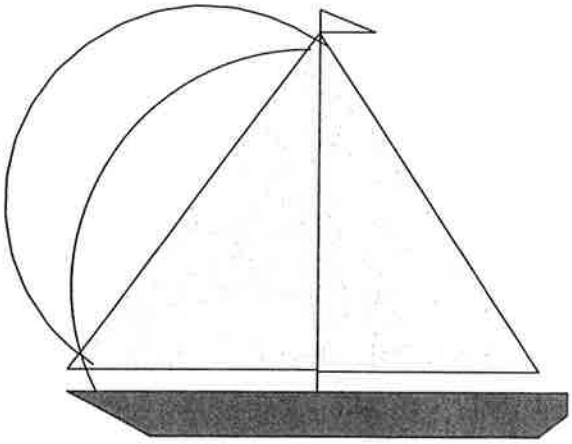
(iv) From your graph find how many wheels need to be sold for the company to break-even? **1**

(v) From your graph how many wheels need to be sold for the company to make a profit of $5 000? **1**

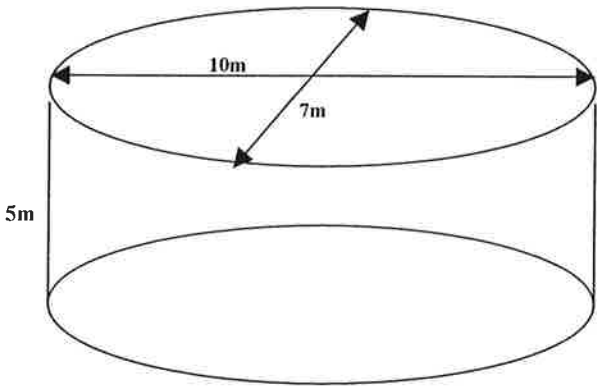
Question 24 continued on next page.

Question 24 (continued) **Marks**

(b) The spinnaker of a yacht is the shape of an isosceles triangle. The equal sides are each 7 metres long and, the angle at the top is 50 degrees. How much material is needed to make the spinnaker? (answer to 3 significant figures). **2**



(c) Water flows into an elliptical tank that is 5 metres high, 10 metres long and 7 metres wide. The water flow stops when the tank is full.



(i) Find the volume of the tank in cubic metres.(to 2 decimal places). **2**

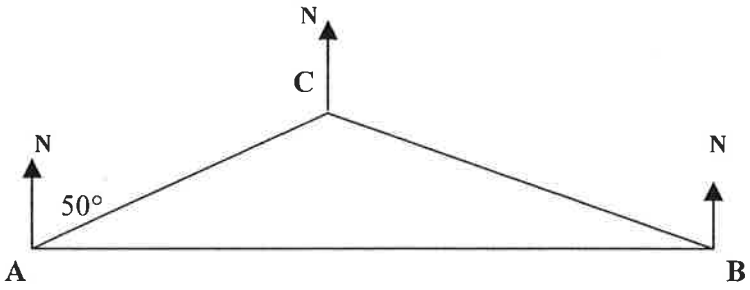
(ii) Using your result from part (i), find the capacity of the tank in litres. **1**

(iii) If the tank is filled at a rate of 20L/s, find the time taken to completely fill the tank. Give your answer to the nearest hour. **2**

QUESTION 25 (13 marks) **Use a separate writing booklet.** **Marks**

(a) A group of hikers are planning a 3-day expedition in the Litchfield National Park.

They are starting at Appleby camping ground and walking overland on a bearing of 050^0, for 15km, to their first overnight camp at Castlerock. The following day they travelled 19km to Bluegum Clearing, which is due east of Appleby.



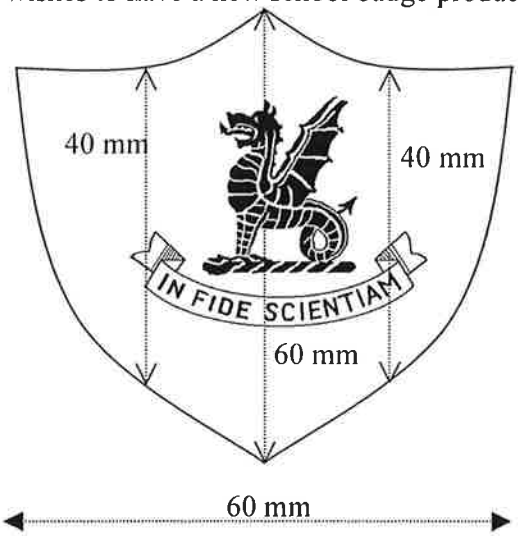
Copy the triangle onto your answer sheet.

(i) Find $\angle CAB$. **1**

(ii) Using the sine rule find $\angle CBA$, to the nearest degree. **2**

(iii) How far do they travel on their third day of hiking to return to their starting position at Appleby? (to the nearest kilometre). **3**

(b) Newington College wishes to have a new school badge produced.



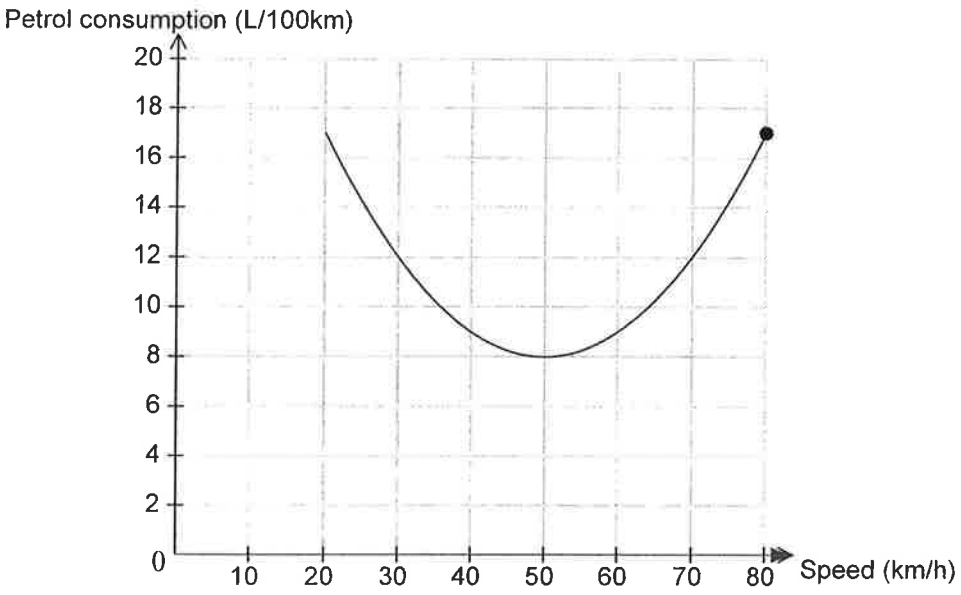
(i) Using two applications of the Simpson's rule find the area of the badge, to the nearest square millimetre. It is divided into 4 equal strips. **2**

(ii) If the Newington college wyvern logo takes up an area of $720mm^2$. What percentage of the badge contains the Newington logo? (to 1 decimal place). **1**

Question 25 continued on next page

Question 25 (continued) **Marks**

(c) A car was test driven at various speeds and the petrol consumption was recorded. The results are shown in the following graph.



(i) What was the petrol consumption recorded at 40km/h? **1**

(ii) During the test, the car was driven at 70km/h for 50km. How much petrol did it consume? **2**

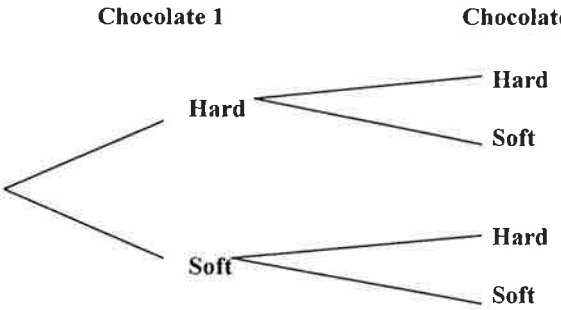
The graph is modelled by the formula $C = 0.01S^2 - S + 33$ for speeds from 20km/h to 80km/h, where **C** is the petrol consumption in litres per 100km, and ***S*** is the speed in km/h.

(iii) Use this formula to calculate the petrol consumption at 90km/h. **1**

QUESTION 26 (13 marks) Use a separate writing booklet **Marks**

(a) Melissa has been given a box of chocolates. 15 are hard centres and 25 are soft centred. Melissa takes two chocolates and eats them.

Complete the diagram below onto your answer sheet.



What is the probability that

(i) the first chocolate chosen is hard centred? **1**

(ii) both are hard centred? **1**

(iii) at least one is hard centred? **2**

(b) Howard's Hardware store sells two brands of garden mix, "Green Thumb" and "Flower Plus". Both brands are comparable in price. Howard needs to discontinue selling one of the brands of garden mix.

To help him decide which brand to discontinue, he decided to look at the next 10 weeks sales. This table shows the sales of garden mix.

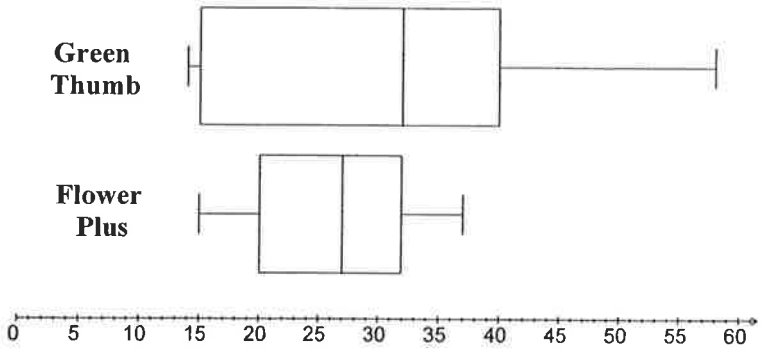
WEEK	1	2	3	4	5	6	7	8	9	10	MEAN	STANDARD DEVIATION
GREEN THUMB	14	28	15	58	15	36	42	29	40	35	31.2	13.36
FLOWER PLUS	20	24	15	25	29	31	32	16	37	32		

Question 26 continued on next page.

Question 26 (continued) **Marks**

(i) Calculate the mean score and the standard deviation of the product "Flower Plus". **2**

Given the two box-and-whisker plots.

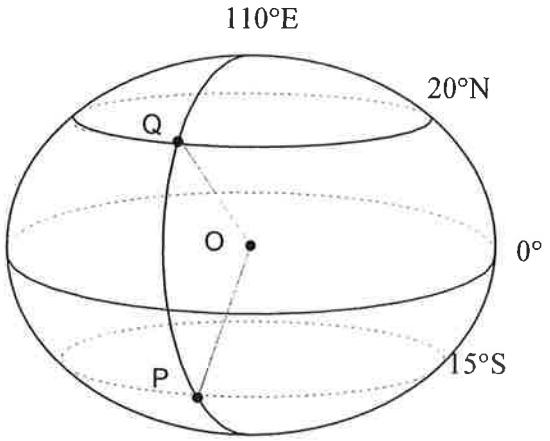


(i) Write down the interquartile range of the "Green Thumb" sales. **1**

(ii) Is **58** in the distribution of "Green Thumb" sales an outlier? Justify your answer. **1**

(iii) Compare and contrast the sales of "Green Thumb" and "Flower Plus". In your answer, comment on the shape and skewness of the distribution, measures of spread and location. **3**

(c) **O** is the centre of the Earth. **P** has the coordinates $(15°S, 110°E)$, and **Q** has to coordinates $(20°N, 110°E)$.



(i) Find the size of the angle **QOP**. **1**

(ii) Calculate the distance between **P** and **Q**. **1**

QUESTION 27 (13 marks) Use a separate writing booklet **Marks**

(a) The Grow-Well Storage Company produces storage silos for use on farms. The surface area (**A**) of the silo is directly proportional to the square of the volume (**v**). A silo of surface area $800m^2$ has a volume of $20m^3$.

(i) Write an equation, which shows the relationship between **A** and **v**. **1**

(ii) Use the information given above to find the value of **k**. **1**

(iii) A farmer buys a silo so that he can store $25m^3$ of grain. What is the size of the surface area of the silo? **1**

(iv) The neighbouring farm can accommodate a silo with a surface area of $650m^2$. How much grain can be stored to the nearest cubic metre? **1**

(b) The cash price for a car at two dealers is given in the table below. Each dealer has different terms of purchase, also indicated below.

	CASH PRICE	TERMS OF PURCHASE
DODGY DANS DEALERSHIP	**$17500**	**20% deposit plus** **48 equal monthly repayments of $467**
SMOOTH SIDS SALEYARD	**$19000**	**$2800 deposit** **48 equal monthly repayments of $480**

(i) Calculate the deposit required by Dodgy Dan. **1**

(ii) Calculate the interest charged by Dodgy Dan. **2**

(iii) Calculate the flat rate interest per annum, charged by Dodgy Dan. Correct to nearest whole %. **2**

(iv) If you had to buy on terms which company would provide the best buy? Justify your answer using mathematical conclusions. **2**

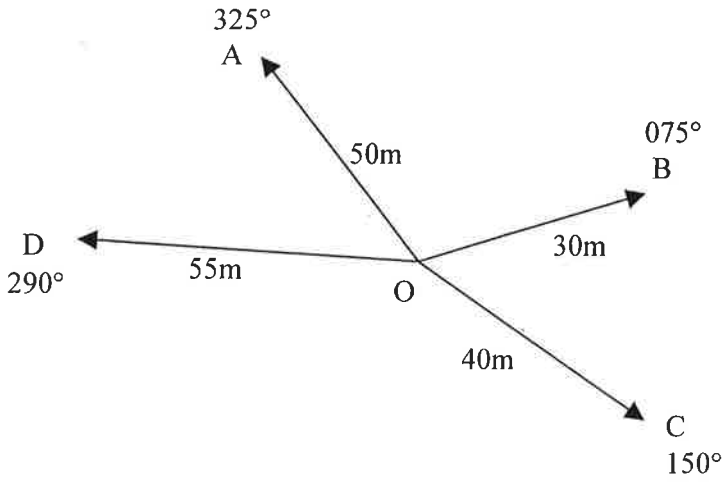
Question 27 continued on next page.

Question 27 (continued) **Marks**

(c) A small plane is purchased at $ 150 000. Use the declining balance method to calculate the book value of the plane after 4 years at a depreciation rate of 20% per annum. **2**

QUESTION 28 (13 marks) Use a separate writing booklet.

(a) The following radial survey was taken of a field.



The diagram is not to scale.

(i) Explain how you know that $\angle AOB = 110°$ **1**

(ii) Calculate the length of the fence along the boundary **AB**, to 2 decimal places. **2**

(b) Melissa borrowed $50 000 at 12% p.a. compounded 6 monthly. The loan is to be repaid by 20 equal repayments over 10 years. Calculate the size of the 6 monthly repayments. **2**

(c) In a game of dice at the Casino two unbiased dice are thrown. The dice each have six faces. The faces are numbered 1,2,3,4,5, and 6. **3**

To play you must pay $5.
If you throw 2 ones you win $20.
If you throw a double you win $10.
You lose if you throw anything else.

What is your financial expectation from this game?

Question 28 continued on next page.

Question 28 (continued) **Marks**

(d) Mary contributed to a superannuation fund for 10 years and then stopped work. During the 10 years she invested $1500 at the end of each year.

After she stopped work the investment was left dormant for the next 15 years, compounded annually over the entire 25 years at a rate of 6% per annum.

(i) How much did Mary actually contribute into her superannuation fund? **1**

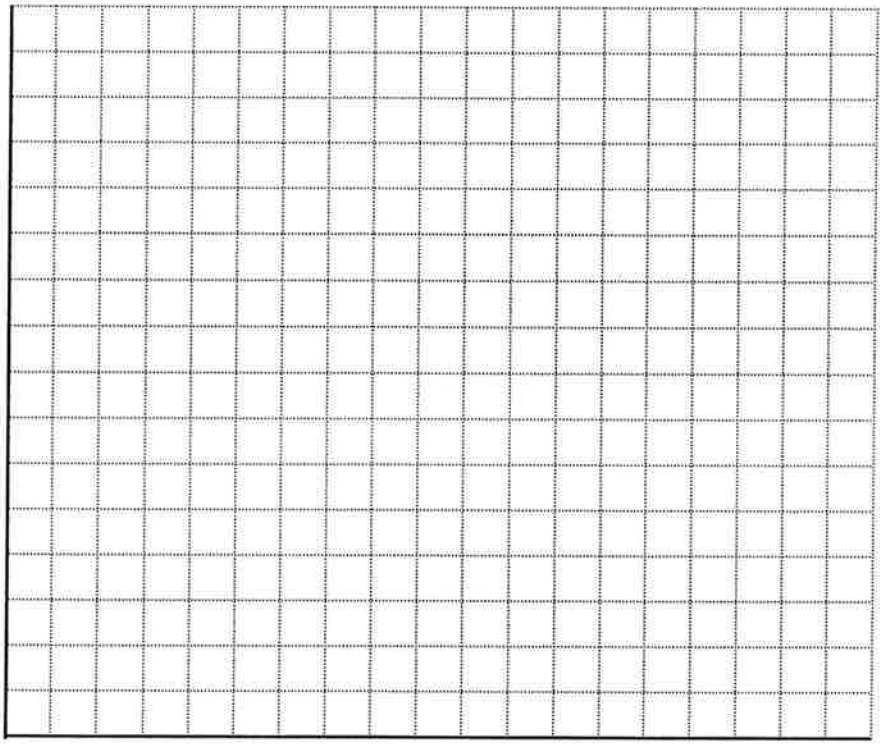
(ii) Show that Mary's investment is worth $ 19771.19 at the end of the first 10 years. **2**

(iii) Calculate the total value of Mary's superannuation investment at the end of the 25-year period. **2**

END OF PAPER

Question 23 part (b) Answer sheet **Computer Number:**_____

(i)



(iii)

(iv)

Insert this page in Answer Booklet for Question 23.

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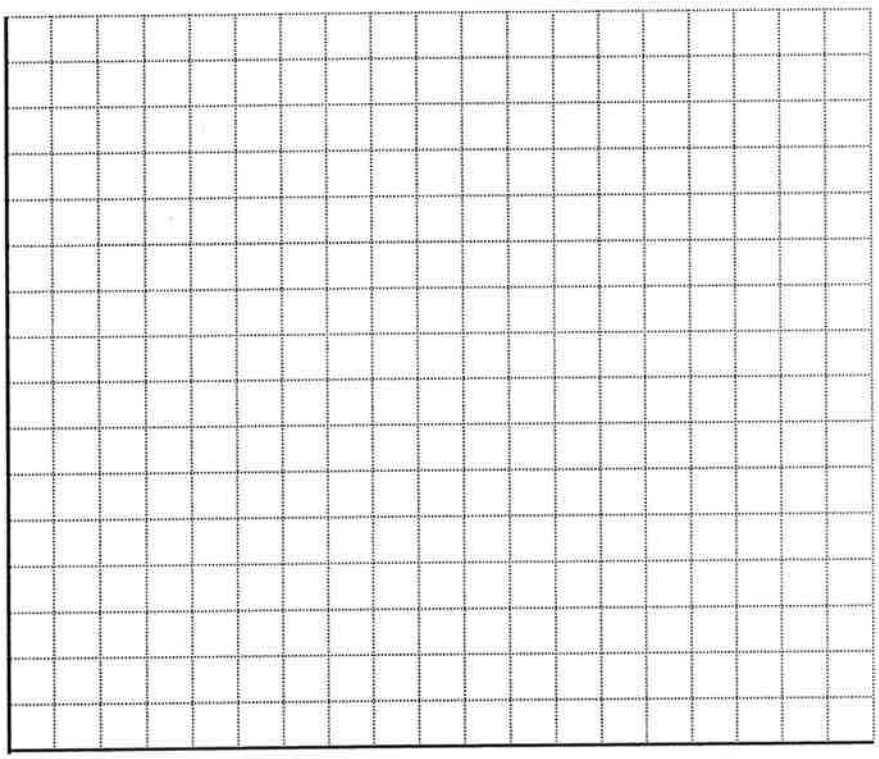
Question 24 part (a) Answer sheet **Computer Number:**_____

(i)

(ii)

(iii)



(iv)

(v)

Insert this page in Answer Booklet for Question 24.

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ENERAL TRIAL 2004 NEWINGTON COLLEGE

SECTION 1

male non-smokers = $\frac{5106}{9048}$
= 56.4%
(C)

) median = 16 (B)

Actual Measurement
= 83cm ± 0.5cm
= 82.5cm to 83.5cm (D)

) (D)

) $r = \sqrt[3]{\frac{3V}{4\pi}}$
$= \sqrt[3]{\left(\frac{3\times 95}{4\pi}\right)}$
$= 2.830598889$
$d = 5.661197778$
$d = 5.7$cm (1dp) (B)

) monthly repayment per $1000 = $7.72
Total monthly repayment = $7.72 × 150
= $1158
Total repayment = 1158 × 12 × 25
= $347400
(B)

) $\tan 35^\circ = \frac{h}{20}$
$h = 20 \tan 35^\circ$ (A)

) Races to win = 65% × 40
= 26 (C)

) Number of selections = 5 × 4
= 20 (C)

) $\frac{3p-7}{2} = 10$
$3p - 7 = 20$
$3p = 27$
$\therefore p = 9$ (D)

(11) Tax Payable = $9146 + 0.44 × (45000 − 39400
= $11610 (B)

(12) % dividend yield = $\frac{49}{550} \times 100$
= 8.9% (1dp) (C)

(13) Surface Area = $\pi \times 10^2 + 2\pi \times 10 \times 5$
$= 100\pi + 1000\pi$
$= 1100\pi$ cm^2 (C)

(14) 0.000 000 018 $= 1.8 \times 10^{-8}$ (C)

(15) English $60 < \bar{x} - 1SD$
Geography $62 < \bar{x} - 1SD$
Mathematics $49 > \bar{x} - 1SD$
Physics $52 = \bar{x} - 2SD$
∴ Maths. (D)

(16) $A = P(1+r)^n$
$A = 2500(1.01)^{36}$ (B)

(17) (C)

(18) $3x^2(4-x) + x(x-2)$
$= 12x^2 - 3x^3 + x^2 - 2x$
$= 13x^2 - 3x^3 - 2x$ (C)

(19) Rel-freq = $\frac{9}{40}$
= 22.5% (A)

(20) (A) correlation = −0.8

(21) Degrees Difference = 350°
Time Difference = 35 × 4
= 140 mins
= 2h 20min (C)

(22) Approx. 95% of scores will lie between = $\bar{x} \pm 2SD$
= 58 ± 11 × 2
= 58 ± 22
= 36 to 80 (B)

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Section II

Question 23

) Hours worked $= 35 + 7 \times 1\frac{1}{2}$

$= 45.5$ h

$\therefore 45.5h = 528.71$

$= \$11.62$

the normal hourly rate is \$11.62

Question 23

(c)(i) $h^2 = 20^2 + 25^2$

$h = 32.0156...$

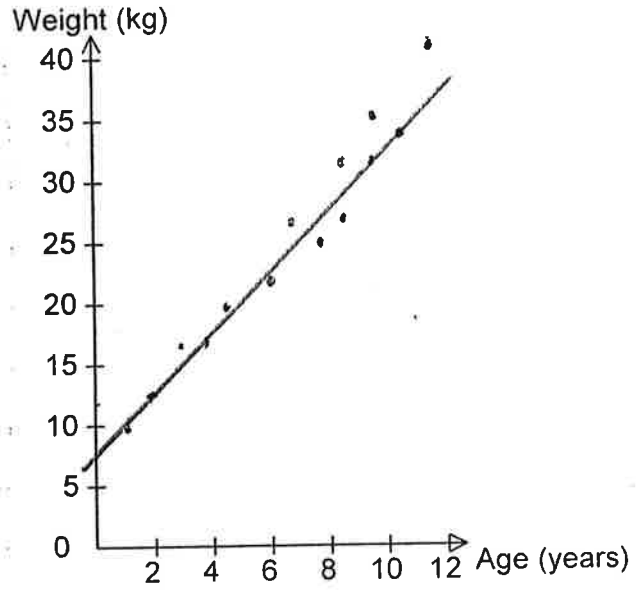
$h = 32$cm (n.cm)

(ii) $SA = 4 \times \frac{1}{2}bh$

$= 4 \times \frac{1}{2} \times 0.5 \times 0.320...$

$= 0.32$ m^2 (2sp)

b)



Passes thrugh (2,12) and (11,33)

$m = \frac{33-12}{11-2}$

$= \frac{21}{9}$

$= 2\frac{1}{3}$

y int = 8

$y = 2\frac{1}{3}x + 8$

raphics $y = 2\frac{1}{3}x + 8.4$

When $x = 17$ $y = 2\frac{1}{3} \times 17 + 8$

$y \doteq 47\frac{2}{3}$ kg

$y \doteq 48$ kg (nkg).

Accept $\bar{x}$ between 2 → 3

y int between 6 – 10

The correct sub into the ir equation.

(d)(i) Number of possible arrangemen

$= 7 \times 6 \times 5 \times 4$

$= 360$

(ii) Probability $= \frac{360}{7 \times 6 \times 5 \times 4}$

$= \frac{360}{840}$

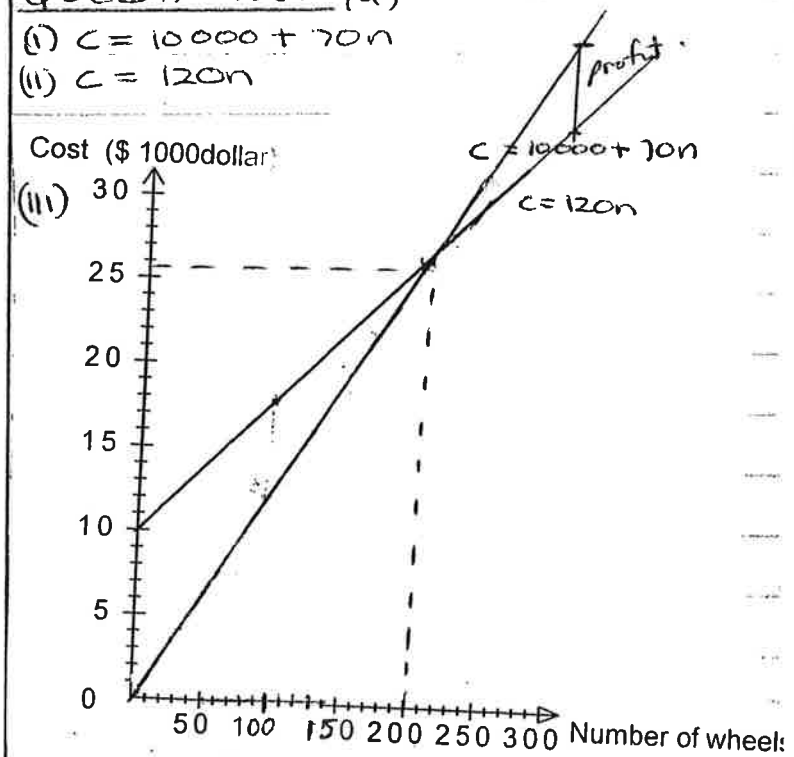
$= \frac{3}{7}$

Question 24 (a)

(i) $C = 10000 + 70n$

(ii) $C = 120n$

(iii)



$C = 10000 + 70n$

n	0	50	100	150	200
C	10000	13500	17000	20500	24000

$C = 120n$

n	0	50	100	150	200
c	0	6000	12000	18000	24000

(iv) Breakeven point ≐ 200 wheels

(v) \$5000 profit at ≐ 300 wheels

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Question 24

(b) 

$A = \frac{1}{2} \times 7 \times 7 \times \sin 50$

$= 18.76808886$

$= 18.8\ m^2$ (3sf)

(c)(i) $V = (\pi \times 5 \times 3.5) \times 5$

$= 274.8893572\ m^3$

$= 274.89\ m^3$ (2dp)

(ii) $C = 274.89 \times 1000$

$= 274890\ L$

(iii) Rate = 20L/s

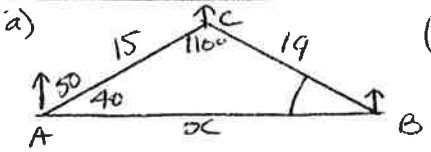
Time $= 274890 \div 20$

$= 13744.5\ s$

$= 3.8179$

$= 4h$ (nh)

Question 25

a) 

(a)(i) $\angle CAB = 40°$

(ii) $\frac{\sin 40}{19} = \frac{\sin B}{15}$

$\sin B = \frac{15 \sin 40}{19}$

$B° = 30.49504869$

$B° = 30°$ (n.d).

(iii) $\frac{xc}{\sin 110} = \frac{19}{\sin 40}$

$x = \frac{19 \sin 110}{\sin 40}$

$x = 27.77614\ 18$

$x = 28\ km$ (n.km)

(b)(i) $A = \frac{15}{3}\{0 + 4 \times 40 + 60\} + \frac{15}{3}\{60 + 4 \times 40 + 0\}$

$= 5\{220\} + 5\{220\}$

$\therefore A = 2200\ mm^2$

(ii) % area of logo $= \frac{720}{2200} \times 100$

$= 32.72\%$

$= 32.7\%$ 1dp.

Question 25 (c)

(i) Petrol consumption $\doteq$ 9L/100km

(ii) Petrol consumption at 70km/h = 12L/100k

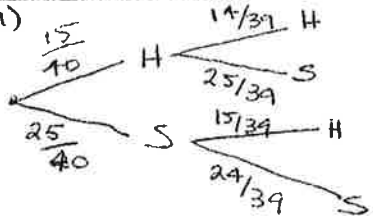
Petrol consumption for 50km = 6L

(iii) $C = 0.01 \times 90^2 - 90 + 33$

$= 24L$

$\therefore$ the consumption is 24L

Question 26

(a) 

(i) $P(\text{Hard}) = \frac{15}{40} = \frac{3}{8}$

(ii) $P(HH) = \frac{15}{40} \times \frac{14}{39} = \frac{7}{52}$

(iii) P(at least one hard) $= P(HH) + P(HS) + P(S$

$= \frac{7}{52} + \frac{15}{40} \times \frac{25}{39} + \frac{25}{40} \times \frac{15}{39}$

$= \frac{8}{13}$

(b)(i) Flower Plus $\bar{x} = 26.1$ (1dp)

S.D. $= 6.99$ (2dp)

(ii) Green Thumb IQR $= Q_3 - Q_1$

$= 40 - 15$

$= 25$

(iii) Is $58 > 40 + (1.5 \times 25)$

$58 > 77.5$?

No $\therefore$ 58 is not an outlier.

(iv) Both distributions are negatively skewe

- The Green Thumb mean is more than Th mean of Flower Plus and would ha been affected by the 58 sales in one w
- Green thumb is less consistent in th number of sales as shown by compari the S.D's. The Green Thumb SD is 13.36 but Flower Power has a more consistant rate of sales with a SD of 6.99.
- more than 25% of the sales of Green Thumb are more than the max sale of Flower Plus.

(c) $\angle QOP = 35°$

QP 1' = 1n.m

QP $= 35 \times 60$

$= 2100'$

$= 2100\ nm.$

$\therefore$ The distance QP is 2100nm

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Question 27

(i) $A \propto V^2$

$A = kV^2$

(ii) $800 = k \times (20)^2$

$800 = k \times 400$

$\therefore k = 2$

(iii) $\therefore A = 2V^2$

$A = 2 \times 25^2$

$A = 1250\ m^2$

(iv) $A = 2V^2$

$650 = 2 \times V^2$

$325 = V^2$

$V = 18.027756 38\ m^3$

$V = 18 m^3$ (n. m^3)

---

b)(i) Podgy Dan Deposit = 20% x 17500

= $3500

(ii) Total repayments + Dep = 3500 + 48 x 467

= $25916

Interest charged = $25916 − $17500

= $8416

(iii) $I = PRN$

$8416 = 14000 \times r \times 4$

$8416 = 56000 \times r$

$r = 0.150 2857143$

$R = 15\%$ (n. %)

(iv) Smooth Sid Total cost

$= 2800 + 48 \times 480$

= $25840

∴ Smooth Sids would be a cheaper purchase.

---

c) $S = V_0(1-r)^n$

$= 150000(0.8)^4$

$= 61440$

∴ the book value is $61440

Question 28

(i) $\angle AOB = 110^\circ$

Bearing of B forms $\angle 75^\circ$

Bearing of A forms $\angle 360 - 325 = 35^\circ$

$\therefore \angle AOB = 75 + 35$

(ii) $c^2 = 30^2 + 50^2 - 2 \times 30 \times 50 \times \cos 110^\circ$

$c^2 = 4426.06043$

$c = 66.52864368$

$c = 66.53\ m$ (to 2dp)

Question 28

(b) $N = M\left(\frac{((1+r)^n - 1)}{r(1+r)^n}\right)$ $N = 50000$, $r = 12\%$ p.a 6% per 6 mo, $n = 20$

$50000 = M\left(\frac{(1.06)^{20} - 1}{0.06(1.06)^{20}}\right)$

$M = 4359.23$ (n.c)

∴ The 6 monthly repayment is $4239.23

(c) All probabilities

$P(1,1) = \frac{1}{36}$

$P(2,2), (3,3), (4,4), (5,5), (6,6) = \frac{5}{36}$

$P(\text{anything else}) = \frac{30}{36}$

All returns

1st Win = $15

2nd Win = $5

No Win = −$5

Expected Financial Return

$= \frac{1}{36} \times 15 + \frac{5}{36} \times 5 + \frac{30}{36} \times -5$

$= -3.06$ (2dp)

∴ You would expect to lose $3.06

(d)(i) contribution = 10 x 1500

= $15000

(ii) Investment value after 10 years

$A = m\left\{\frac{(1+r)^n - 1}{r}\right\}$

$= 1500\left\{\frac{(1.06)^{10} - 1}{0.06}\right\}$

$= \$19771.19$ (n.c).

(iii) $A = P(1+r)^n$

$= 19771.19(1.06)^{15}$

= $47383.81 (n.c)

∴ the investment will be worth $47383.8