

STUDENT NUMBER

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2011
Trial Higher School Certificate
Examination

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time - 2½ hours
- Write using black or blue pen
- Calculators may be used
- A formulae sheet is provided at the back of this paper

QUESTION	MARK
MULTIPLE CHOICE 1-22	/22
23	/13
24	/13
25	/13
26	/13
27	/13
28	/13
TOTAL	/100

Total marks – 100

Section I Pages 2-11

22 marks

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

Section II Pages 12-24

78 marks

- Attempt Questions 23-28
- Allow about 2 hours for this section

THIS QUESTION PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

This assessment task constitutes 40% of the Higher School Certificate Course Assessment.

Section I

22 marks

Attempt Questions 1–22

Allow about 30 minutes for this section

Use the multiple-choice answer sheet for Questions 1–22.

1. Arrange the decimal numbers 0.888, $0.\dot{8}$ and 0.8 from smallest to largest.

(A) 0.8, $0.\dot{8}$, 0.888

(B) $0.\dot{8}$, 0.888, 0.8

(C) 0.888, $0.\dot{8}$, 0.8

(D) 0.8, 0.888, $0.\dot{8}$

2. Which of the following is the correct simplification of $8x^3 - 15x^3$?

(A) 7

(B) $-7x^3$

(C) -7

(D) $-7x^6$

3. A pyramid has a square base of side 320 metres. Its perpendicular height is 150 metres.
What is the volume of the pyramid ?

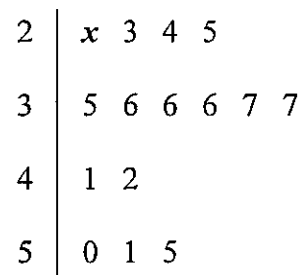
(A) 5 120 000 m³

(B) 15 360 000 m³

(C) 48 000 m³

(D) 16 000 m³

4. The results of a history test are displayed in this stem-and leaf plot

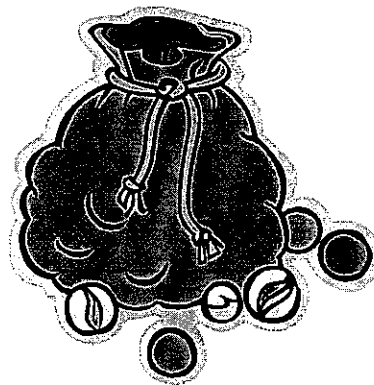


The range of the data is 32. What is the value of x ?


- (A) 22
- (B) 23
- (C) 2
- (D) 3
5. Preeti has 2 bags of marbles. Each bag contains one red and three blue marbles. Preeti takes one marble from each bag without looking.

What is the probability that both marbles are blue?

- (A) $\frac{3}{4}$
- (B) $\frac{6}{4}$
- (C) $\frac{6}{8}$
- (D) $\frac{9}{16}$



6.

	Boomerang Council		RATES AND CHARGES NOTICE 1st July 2001 to 30th June 2002	
	Z Smith 14 The Crescent Boomerang		Customer Ref No 1111111	Due Date 31/08/2001
		Issue Date 17/07/2001	Assessment No 11111-00000-1	
PROPERTY RATING CATEGORY Residential	VALUER GENERAL'S LAND VALUE \$377 000	VALUATION BASE DATE 01/07/2000		
RATES & CHARGES	RATEABLE VALUE OR QTY	CENTS IN \$ OR CHARGE	AMOUNT	
Residential rate	\$377 000	0.272950	<input type="text"/>	
Waste Mgt Chg 80 litres	1	\$195.00	\$195.00	
			TOTAL PAYABLE	<input type="text"/>
Payments made after 29/06/2001 will not be shown on this notice.				

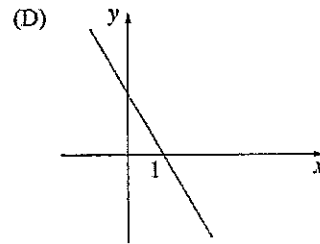
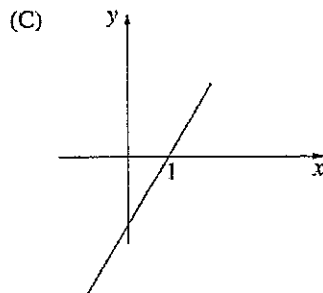
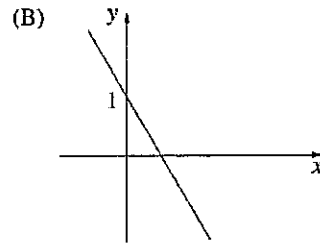
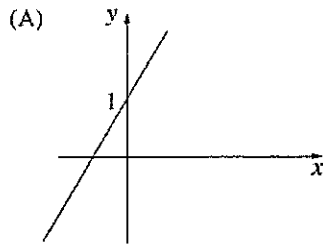
What is the residential rate amount?

- (A) \$ 138.12
- (B) \$ 272.95
- (C) \$ 1029.02
- (D) \$ 27 295

7. If $a = b^3 + 4$, what is the value of b when $a = 12$?

- (A) + 2
- (B) - 2
- (C) ± 2
- (D) + 8

8. Which one of the following could be the graph of $y = -3x + 1$?



9. Beach Bombo is a game played with a large hollow spherical ball made from silver vinyl. The diameter of the ball is 1.4 metres.

If the vinyl costs \$ 27 per square metre, which of the following is closest to the cost of the vinyl for one ball?

- (A) \$ 665
- (B) \$ 310
- (C) \$ 166
- (D) \$39

10. Rae has 3500 shares with a current market value of \$ 3.70 each. During the past twelve months, she received a total dividend of \$ 425.

What is the current dividend yield on these shares?

- (A) 0.328%
- (B) 0.871%
- (C) 3.28%
- (D) 8.71%

11. Results for an English exam are given as z-scores. In this exam Dave gained a z-score of 2. The exam had a mean of 55 and a standard deviation of 6.

What was Dave's actual mark in this exam ?

- (A) 67
- (B) 57
- (C) 53
- (D) 43

12. The table shows monthly repayments for loans over 30 years.

		<i>Loan amount</i>			
		\$100 000	\$150 000	\$200 000	\$250 000
<i>Interest rate per annum</i>	5.0%	\$537	\$806	\$1074	\$1343
	5.5%	\$568	\$852	\$1136	\$1420
	6.0%	\$600	\$900	\$1200	\$1499
	6.5%	\$633	\$949	\$1265	\$1581
	7.0%	\$666	\$998	\$1331	\$1664
	7.5%	\$700	\$1049	\$1399	\$1749

Jackie borrows \$ 150 000 over a period of 30 years at 7.0% per annum.

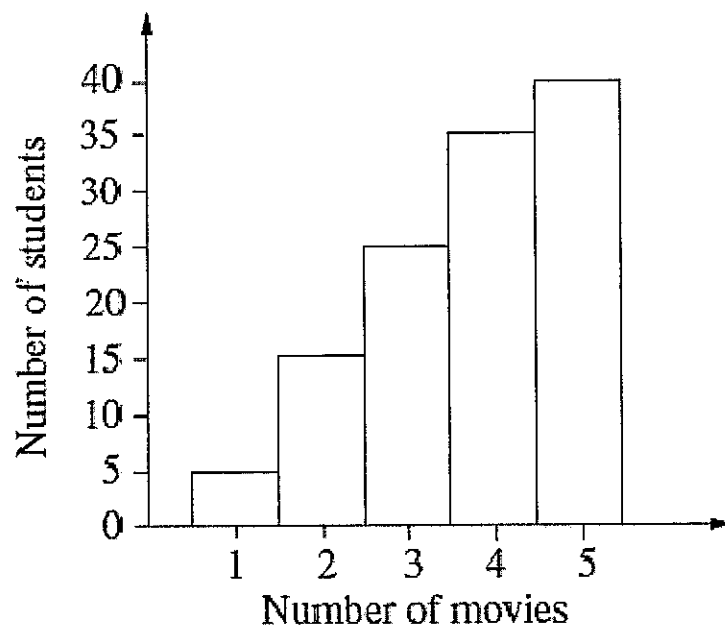
How much would Jackie repay over 30 years if the interest rates remain the same?

- (A) \$ 998
- (B) \$ 479 160
- (C) \$ 359 280
- (D) \$ 29 950

13. In June 2010, Zac purchased a new computer for \$ 2800. Use the declining balance method of depreciation to determine the value of the computer in June 2012, assuming a depreciation rate of 30% per annum.
Answer correct to 3 significant figures.

- (A) \$ 1120
- (B) \$ 1370
- (C) \$ 1680
- (D) \$ 1960

14. Students were surveyed about the number of movies they had watched in the last month. The results are shown in this *cumulative* frequency histogram.



How many students said they watched three movies last month?

- (A) 10
- (B) 15
- (C) 25
- (D) 35

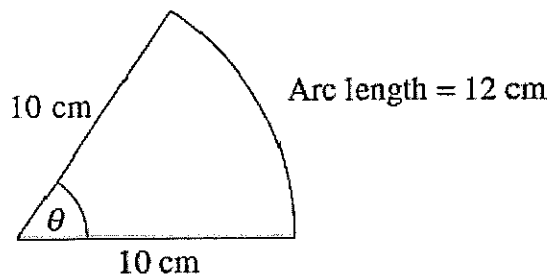
15. In the town of Bogan the ages of residents are normally distributed.
The mean age is 52 years and the standard deviation is 10 years.
Approximately what percentage of the residents are younger than 42?

- (A) 45%
- (B) 34%
- (C) 16%
- (D) 13.5%

16. James, Ben, Rob and Don plan a running race against each other.
James, Ben and Rob are each twice as likely as Don to win the race.
What is the probability that Don will win the race?

- (A) $\frac{1}{8}$
- (B) $\frac{1}{7}$
- (C) $\frac{1}{6}$
- (D) $\frac{1}{5}$

17. This is a sketch of a sector of a circle.



NOT TO
SCALE

Find the value of θ to the nearest minute.

- (A) $68^\circ 45'$
- (B) $68^\circ 46'$
- (C) $69^\circ 0'$
- (D) $48^\circ 45'$

18. Calculate the present value of an annuity in which \$ 1 500 is invested at the end of every year for ten years and interest is paid annually at a rate of 6.5% per annum. Answer to the nearest dollar.

- (A) \$ 20242
- (B) \$ 14025
- (C) \$ 10783
- (D) \$ 2816

19. Alex buys a \$2 ticket in a raffle. There are 100 tickets in the raffle and two prizes. First prize is \$50 and second prize is \$25.

Find Alex's financial expectation, taking into account the cost of his ticket.

- (A) - \$ 1.75
- (B) - \$ 0.25
- (C) + \$ 0.75
- (D) - \$ 1.25

20. The sheets of paper Melanie uses in her photocopier are 22 cm by 28 cm. The paper is 80gsm (grams/square metre). This means that one square metre of this paper has a mass of 80 grams.

Melanie has a pile of paper weighing 27.104 kg.

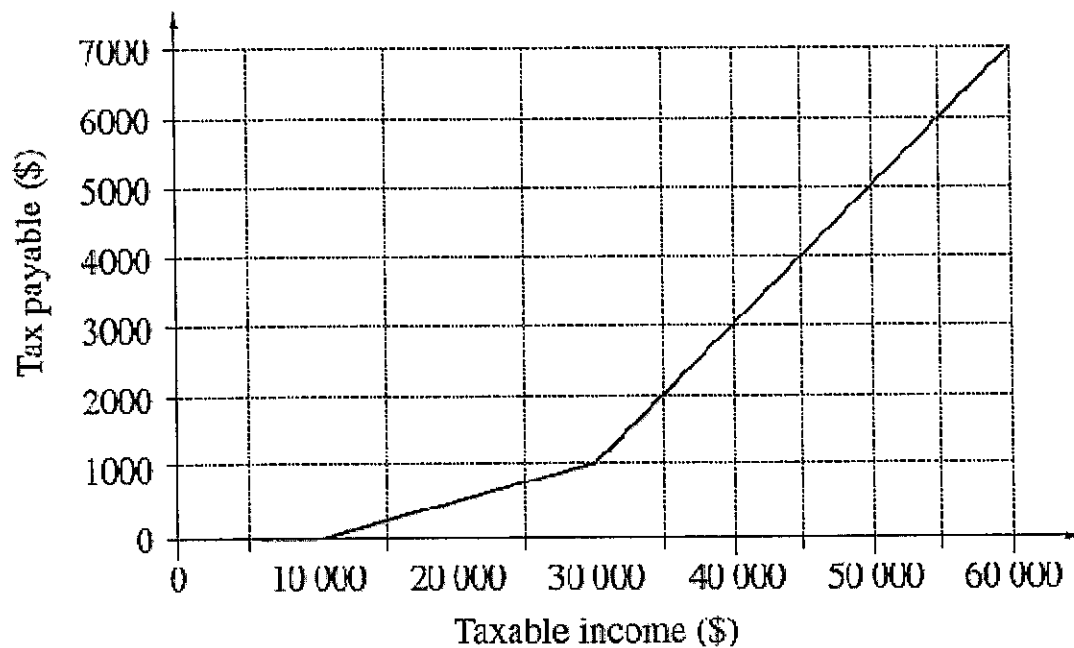
How many sheets of paper are in the pile?

- (A) 550
- (B) 600
- (C) 5500
- (D) 6000

21. In one year the population of a city increased by 15%.
The next year it decreased by 10%.

What was the percentage increase in the population over the two years?

- (A) 25%
(B) 12.5%
(C) 5%
(D) 3.5%
22. The graph shows the tax payable for taxable incomes up to \$ 60 000 in a proposed new tax system.



In this new tax system there would be

- (A) no tax-free threshold and a flat rate of tax
(B) no tax-free threshold and a sliding rate of tax
(C) a tax-free threshold and a flat rate of tax
(D) a tax-free threshold and a sliding rate of tax

Section II

78 marks

Attempt Questions 23-28

Allow about 2 hours for this section

Answer each question in a SEPARATE writing booklet.

Extra writing booklets are available.

All necessary working should be shown in every question.

Question 23 (13 marks) Use a SEPARATE writing booklet.		Marks
(a)	Kylie's gross pay is \$1680 per fortnight.	
(i)	Fortnightly deductions from Kylie's gross pay are: * \$305.40 for tax * \$170.35 for superannuation * \$80.28 for private health insurance Calculate her fortnightly net pay.	1
(ii)	Kylie is paid an annual leave loading of 17½% for 4 weeks gross pay. Calculate her annual leave loading.	1
(iii)	Kylie visits France on her holidays. She buys clothes and pays €270 (270 Euros). This price includes a value added tax of 21%.	
(α)	What was the price of the clothes before the tax was added? Give your answer correct to the nearest Euro.	1
(β)	How much is €270 in Australian dollars if \$A1 is worth €0.74? Answer to the nearest cent.	1
(b)	Peter has \$40,000 to invest for 5 years. He has 2 options: * Bank A offers 6.8% per annum interest with the interest compounding annually. * Bank B offers 6.2% per annum interest with the interest compounding quarterly.	
(i)	How much will his investment be worth after 5 years with:	
(α)	Bank A.	1
(β)	Bank B.	2
(ii)	Which Bank would you advise Peter to invest with? Justify your answer.	1

Question 23 continued over page

- (c) Fiona's Fabulous Furniture Shop offers buyers the following hire purchase terms:

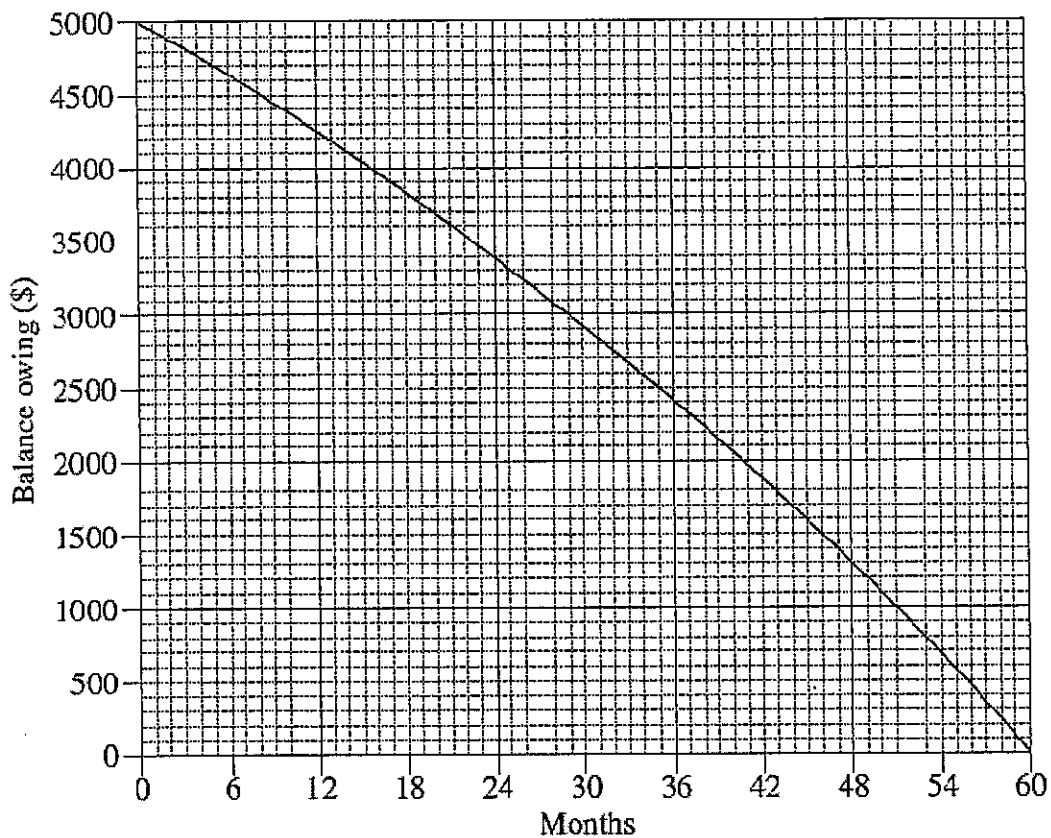
**Fiona's Fabulous Furniture
Hire Purchase Terms**

- 20% deposit
- 12% pa simple interest payable on the balance
- Equal monthly repayments over 4 years

A customer buys furniture worth \$9500 on the above terms. Calculate his monthly repayment.

2

- (d) The graph below shows the balance owing on a bank loan of \$5000 with monthly repayments over 5 years:
Use the graph to answer the following questions.



- (i) Is the loan a FLAT RATE LOAN or a REDUCING BALANCE LOAN?
Give a reason for your answer.
- (ii) After how many months is the amount still owing \$1300?
- (iii) What is the balance owing after two and a half years?

1

1

1

End of Question 23

Question 24 (13 marks) Use a SEPARATE writing booklet

Marks

- (a) Denise and Mark are in a German class of 12 students. The class is going on a tour of Germany. The students pack one bag for the trip. The bags are weighed and the weights (in kgs) are listed in order as follows:

13, 14, 14, 16, 17, 18, 18, 18, 19, 21, 22, 23

- (i) A bag is selected at random. What is the probability that the bag chosen weighed less than 15 kgs? 1

- (ii) While Mark waits for the bus to take them to the airport he works out the five number summary for the weights of the bags: 2

13, 15, 18, 20, 23

Using this five number summary, construct an accurate box-and-whisker plot to display the distribution of the weights of the bags.

- (iii) Calculate the interquartile range of the weights. 1

- (b) The table below tabulates the results for a test for Type II Diabetes:

	TEST RESULTS		
	<i>Accurate</i>	<i>Not Accurate</i>	<i>Total</i>
Total number with diabetes	27	A	30
Number without diabetes	153	17	170
Total:	B	20	

- (i) Determine the values of A and B. 2

- (ii) How many people were tested? 1

- (iii) What fraction of the people tested had diabetes? 1

- (iv) What percentage of patients who had a negative test result actually had diabetes? 1

- (c) A family has four children, Jenny, Melissa, George and David. From these children one is selected to wash the dishes, another is selected to dry the dishes.

- (i) Draw a tree diagram. 2

- (ii) Find the probability that Jenny washes and George dries the dishes. 1

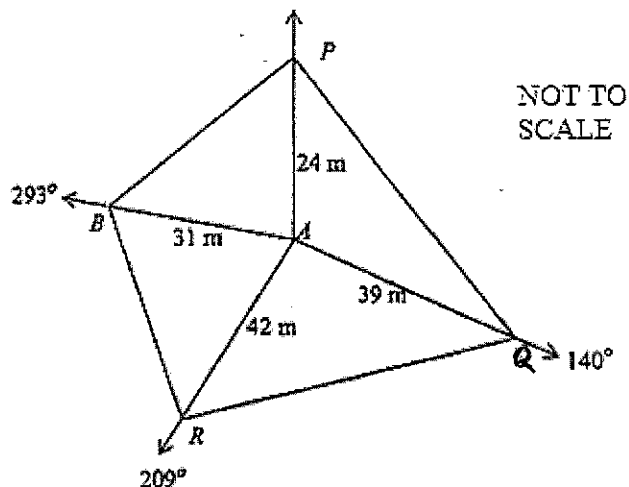
- (iii) Find the probability that David is not selected to do either task. 1

End of Question 24

Question 25 (13 marks) Use a SEPARATE writing booklet.

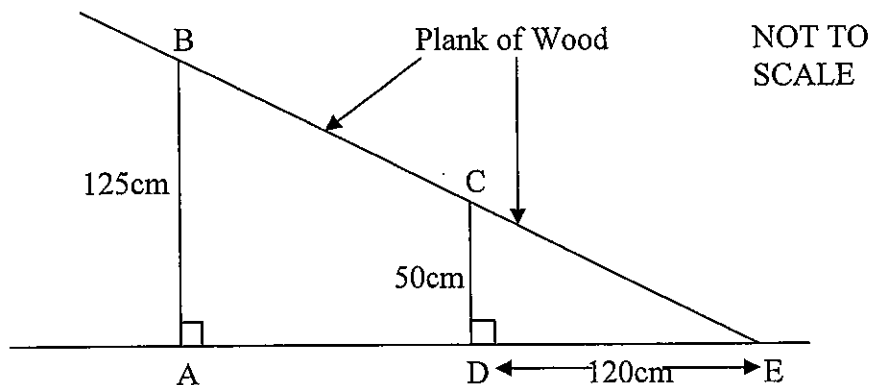
Marks

(a) The diagram below shows a radial survey of a piece of land.



- | | | |
|-------|--|---|
| (i) | Find the size of $\angle QAR$ | 1 |
| (ii) | Find the length of QR , correct to one decimal place | 2 |
| (iii) | Find the area of $\triangle QAR$ | 1 |

(b)



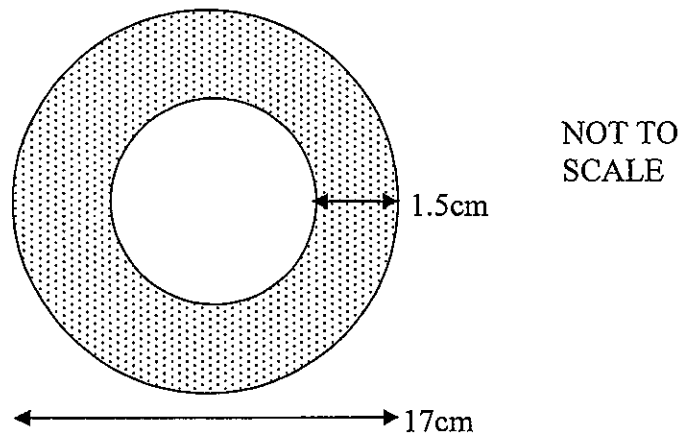
One end of a plank of wood rests at point E on the horizontal ground. The other end rests at B at the top of a vertical brick wall AB . A piece of timber, CD , is wedged vertically under the plank to support it.

- | | | |
|-------|--|---|
| (i) | Write down the names of the two triangles in the diagram that are similar. | 1 |
| (ii) | Find the distance CE . | 1 |
| (iii) | What is the length of the plank? | 1 |

Question 25 continued over page

Question 25 continued

(c) The cross-section of a plastic pipe with an outer diameter of 17 cm is shown below.



The pipe has a thickness of 1.5 cm.

- (i) What is the inner diameter of the pipe? 1
- (ii) Calculate the area of the shaded annulus, correct to three significant figures. 2
- (d) A group of tourists leave Perth ($32^{\circ} S, 120^{\circ} E$) by plane on an 8 hours flight to Cape Town ($33^{\circ} S, 15^{\circ} E$) at 4 pm Monday.
- (i) What is the time difference between Perth and Cape Town? 1
- (ii) What time is it in Cape Town when the plane leaves Perth? 1
- (iii) If the return flight leaves Cape Town at 6 am (local time) on Friday when does it arrive in Perth? 1

End of Question 25

Question 26 (13 marks) Use a SEPARATE writing booklet.

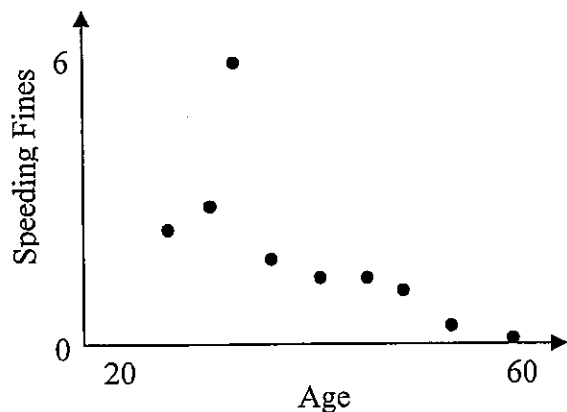
Marks

- (a) Renato performed a survey on all the households in his street. He asked householders about the number of children in their house. His results are recorded in the table below.

Number of Children	Frequency
1	3
2	7
3	9
4	3
5	2

- (i) Complete an fx column in your answer booklet **1**
Do not copy the rest of the table
- (ii) Calculate the mean number of children per household. **1**
- (iii) Calculate the population standard deviation, correct to 1 decimal place **1**

- (b) A sample of drivers was asked for their age and the number of speeding fines they had received over the past six years. The results were displayed on a scatterplot.



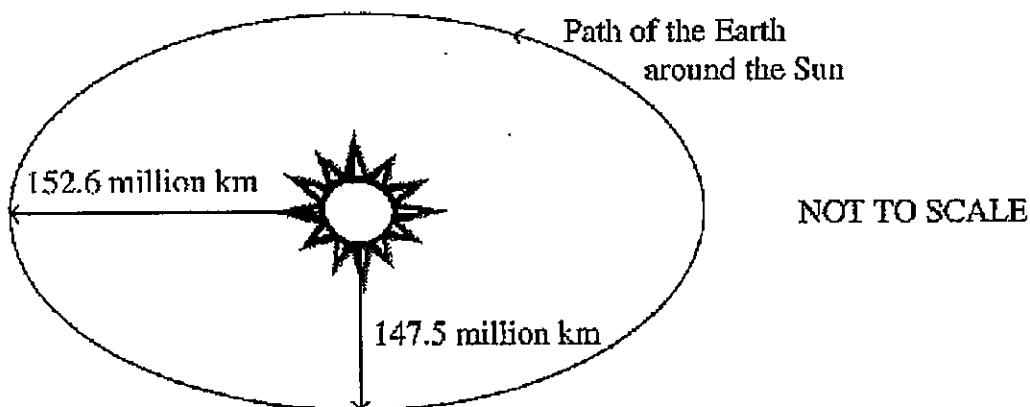
- (i) State the type of correlation that the graph shows. **1**
- (ii) What conclusion can be made from the scattergraph. **1**

Question 26 continued over page

- (c) Two athletes train for the State Championships and record the following times, in seconds, in unofficial competitive heats on 7 consecutive days.

Petra	12.08	11.98	13.23	12.99	11.27	14.66	14.21
Katrina	15.98	14.87	14.21	11.34	11.59	10.99	15.75

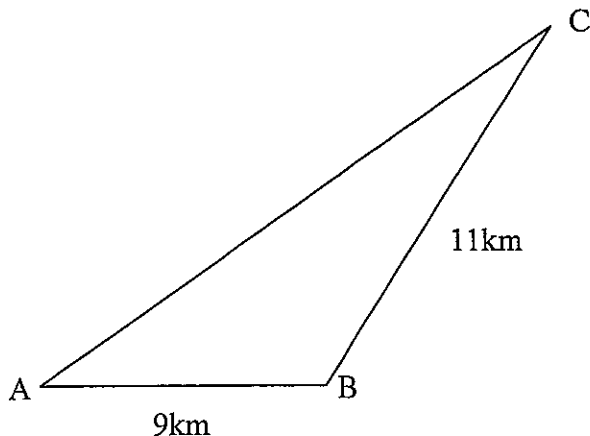
- (i) Which athlete recorded the fastest time? 1
- (ii) Which athlete recorded the smallest range of times? 1
Show calculations to support your answer.
- (iii) Calculate the mean and sample standard deviation for EACH of the two athletes. 2
- (iv) By statistically justifying your answer, decide which athlete you would select to represent New South Wales. 2
- (d) The orbit of the Earth around the Sun is in the shape of an ellipse. The closest the Earth gets to the sun is 147.5 million km and the furthest away is 152.6 million km.



Calculate the area of the ellipse traced out by the Earth's movement around the Sun. 2
Give your answer in scientific notation.

End of Question 26

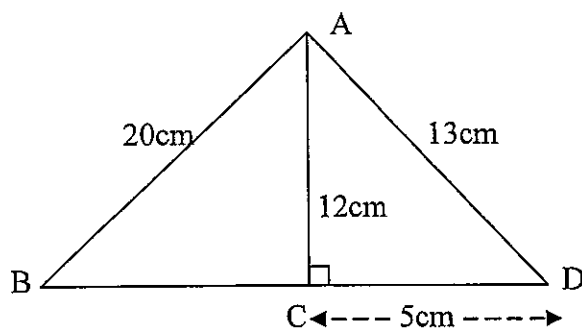
- (a) In the diagram, A, B and C represent the locations of three towns. The town B is due east of A, and the bearing of C from B is 049° .



NOT TO SCALE

- | | | |
|-------|--|---|
| (i) | Find the size of $\angle ABC$, correct to the nearest degree. | 1 |
| (ii) | Find the distance AC correct to one decimal place. | 2 |
| (iii) | What is the bearing of B from C. | 1 |

- (b)

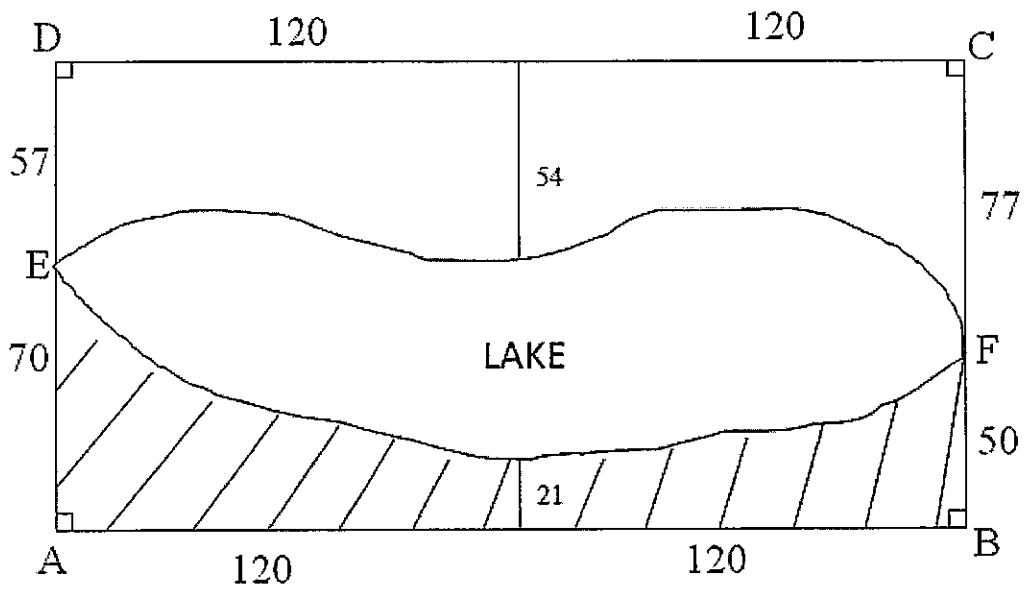


NOT TO SCALE

- | | | |
|------|--|---|
| (i) | Find the perimeter of $\triangle ABD$. | 2 |
| (ii) | Find the size of $\angle ABC$ to the nearest minute. | 2 |

Question 27 continued over page

- (c) In order to find the area of a dam, John took some measurements (in metres) and drew the following diagram: *Diagram is NOT TO SCALE*



- (i) Use Simpson's Rule to find the shaded area ABFE. 2
- (ii) Calculate the area of the lake. 3

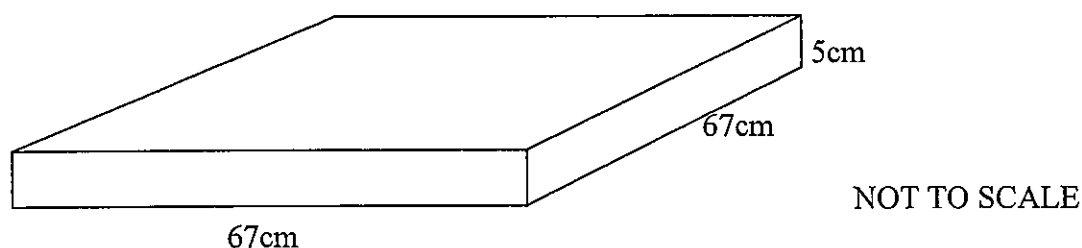
End of Question 27

(a) A cardboard lid for a square box has the following dimensions:

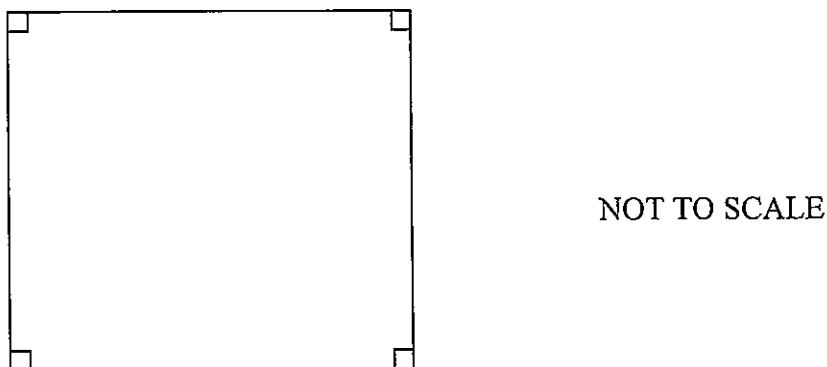
Side length, S = 67cm

Height, h = 5cm

The diagram below shows the outside dimensions of the box:



- (i) Calculate the surface area of the outside of the lid. 2
- (ii) This cardboard lid is to be made from a 2D square sheet of cardboard by cutting a small square from each corner as shown below:



The cardboard is then folded to make the 3D lid.

- (α) What is the length of the side of each of the small squares cut from the corners? 1
- (β) The area, A , of the square sheet of cardboard is 5929cm^2 . 2
Show that this figure is calculated using the formula $A = (S + 2h)^2$

Question 28 continued over page

- (b) Scotty's Sports Caps makes caps for various sporting organisations. There is a fixed monthly cost of \$1800 and it costs \$3 to produce a cap. The caps are sold for \$8 each. The maximum monthly production of caps is 700.

- (i) The equation $C = 3n + 1800$ is used to graph the costs, where C = cost and n = the number of caps produced. 1

Copy and complete this table of values in your Answer Booklet.

$C = 3n + 1800$					
n	0	100	300	500	700
C					

- (ii) The equation $I = 8n$ is used to graph the income, where I = income and n = the number of caps sold. 1

Copy and complete this table of values in your Answer booklet:

$I = 8n$					
n	0	100	300	500	700
I					

COMPLETE (iii) ON THE BACK OF YOUR MULTIPLE CHOICE ANSWER SHEET

- (iii) Graph the 2 equations for Cost and Income on the same set of axes 3
Label your 2 graphs Cost and Income.

Use your graphs to answer the following questions:

- (α) Explain the significance of the point (360, 2880) for Scotty's Sports Caps business? 1
- (β) Approximately how many caps must be sold before he starts to make a profit? 1
- (iv) Scotty decides that he will only continue producing caps if he sells at least 500 caps a month. Do you think this is a good decision? Explain your answer. 1

End of Paper



Killara

HIGH SCHOOL

STUDENT NUMBER

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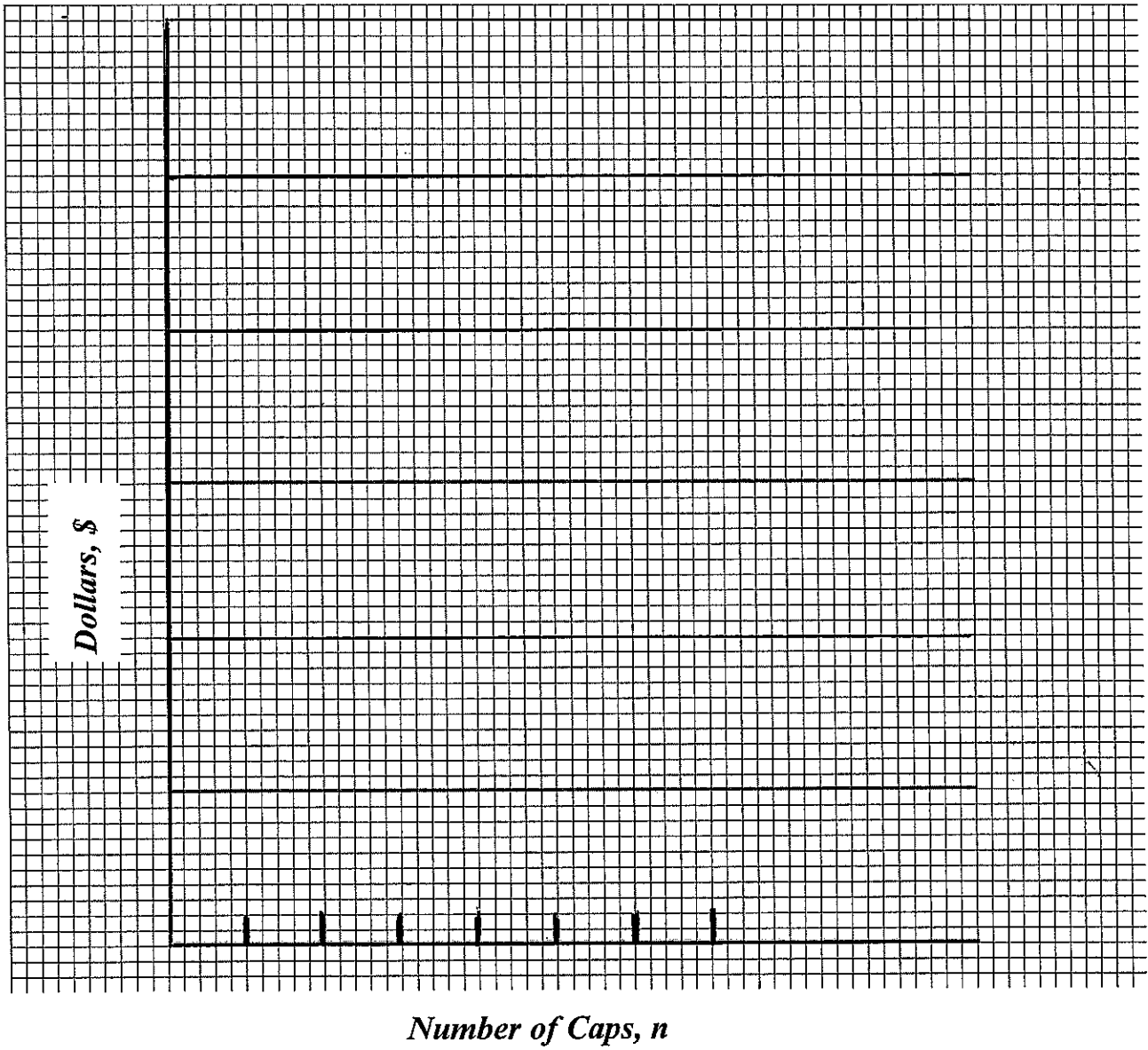
Multiple Choice Answer Sheet

Completely fill the response oval representing the most correct answer.

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D
10. A B C D
11. A B C D
12. A B C D
13. A B C D
14. A B C D
15. A B C D
16. A B C D
17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D
22. A B C D

Complete Question 28(b) (iii) on this page

SCOTTY'S SPORTS CAPS – COST AND INCOME



General Mathematics

FORMULAE SHEET

Area of an annulus

$$A = \pi(R^2 - r^2)$$

R = radius of outer circle

r = radius of inner circle

Area of an ellipse

$$A = \pi ab$$

a = length of semi-major axis

b = length of semi-minor axis

Area of a sector

$$A = \frac{\theta}{360} \pi r^2$$

θ = number of degrees in central angle

Arc length of a circle

$$l = \frac{\theta}{360} 2\pi r$$

θ = number of degrees in central angle

Simpson's rule for area approximation

$$A \approx \frac{h}{3} (d_f + 4d_m + d_l)$$

h = distance between successive measurements

d_f = first measurement

d_m = middle measurement

d_l = last measurement

Surface area

Sphere $A = 4\pi r^2$

Closed cylinder $A = 2\pi r h + 2\pi r^2$

r = radius

h = perpendicular height

Volume

Cone $V = \frac{1}{3} \pi r^2 h$

Cylinder $V = \pi r^2 h$

Pyramid $V = \frac{1}{3} A h$

Sphere $V = \frac{4}{3} \pi r^3$

r = radius

h = perpendicular height

A = area of base

Sine rule

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Area of a triangle

$$A = \frac{1}{2} ab \sin C$$

Cosine rule

$$c^2 = a^2 + b^2 - 2ab \cos C$$

or

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

FORMULAE SHEET

Simple interest

$$I = Prn$$

P = initial quantity

r = percentage interest rate per period,
expressed as a decimal

n = number of periods

Compound interest

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

A = final balance

P = initial quantity

n = number of compounding periods

r = percentage interest rate per compounding
period, expressed as a decimal

Future value (A) of an annuity

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

M = contribution per period,
paid at the end of the period

Present value (N) of an annuity

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

or

$$N = \frac{A}{(1+r)^n}$$

Straight-line formula for depreciation

$$S = V_0 - Dn$$

S = salvage value of asset after n periods

V_0 = purchase price of the asset

D = amount of depreciation apportioned
per period

n = number of periods

Declining balance formula for depreciation

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

S = salvage value of asset after n periods

r = percentage interest rate per period,
expressed as a decimal

Mean of a sample

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum fx}{\sum f}$$

\bar{x} = mean

x = individual score

n = number of scores

f = frequency

Formula for a z-score

$$z = \frac{x - \bar{x}}{s}$$

s = standard deviation

Gradient of a straight line

$$m = \frac{\text{vertical change in position}}{\text{horizontal change in position}}$$

Gradient-intercept form of a straight line

$$y = mx + b$$

m = gradient

b = y-intercept

Probability of an event

The probability of an event where outcomes
are equally likely is given by:

$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

2011 KHS GENERAL MATHS TRIAL HSC EXAM - ANSWERS.

SECTION I: MULTIPLE CHOICE

22 MARKS

1	D	7	A	13	B	18	C
2	B	8	B	14	A	19	D
3	A	9	C	15	C	20	C
4	D	10	C	16	B	21	D
5	D	11	A	17	A	22	D
6	C	12	C				

SECTION II

Question 23 13 marks

Questions targetted for rounding etc:

- 1) Q25(c)(ii) rounding - significant figures
- 2) Q26(d) answer in scientific notation.
- 3) Q27(b)(ii) angle - nearest minute.
- 4) Q28(b)(iii) must show construction line on graph.

$$\begin{aligned}
 \text{(a) (i) Net pay} &= 1680 - 3.05 \cdot 40 - 170.35 \\
 &\quad - 80.28 \\
 &= \underline{\underline{\$1123.97}} \quad \textcircled{1}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) 4 weeks pay} &= 1680 \times 2 \\
 &= \$3360 \\
 \text{Loading} &= 17.5\% \text{ of } \$6720 \\
 &= \underline{\underline{\$588}} \quad \textcircled{1}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) (a)} \quad 121\% &= \text{€}270 \\
 1\% &= \frac{270}{121}
 \end{aligned}$$

$$\begin{aligned}
 100\% &= \frac{270 \times 100}{121} \\
 &= \underline{\underline{\text{€}223 \text{ to}}} \quad \textcircled{1} \\
 &\quad \text{nearest Euro}
 \end{aligned}$$

$$\begin{aligned}
 (\beta) \quad \text{€}0.74 &= \$A1 \\
 \text{€}1 &= \frac{1}{0.74} \\
 \text{€}270 &= \frac{1}{0.74} \times 270
 \end{aligned}$$

$$\text{€}270 = \underline{\underline{\$364.86}} \quad \textcircled{1}$$

$$\begin{aligned}
 \text{(b)(i) (a) Bank A: } A &= 40000 (1.068)^5 \\
 A &= \underline{\underline{\$55579.71}} \quad \textcircled{1} \\
 \text{(b) Bank B: } A &= 40000 (1.015)^{20} \\
 A &= \underline{\underline{\$54407.47}} \quad \textcircled{1}
 \end{aligned}$$

(ii) Bank A would be better as his investment will amount to $\$1172.24$ more than with Bank B $\textcircled{1}$
(MUST HAVE REASON)

112

Question 23 (continued)

(c) $\text{Deposit} = 9500 \times \frac{20}{100} = \1900

$\text{Amount borrowed} = 9500 - 1900 = \7600

$\text{Interest} = \frac{7600 \times 12 \times 4}{100} = \3648

(i) $\text{Amount to be repaid} = 7600 + 3648 = \11248 (1)

$\text{Monthly repayment} = \frac{11248}{48} = \234.33 (1)

(d) (i) reducing balance loan as the graph is a curved line (1)
(MUST HAVE REASON)

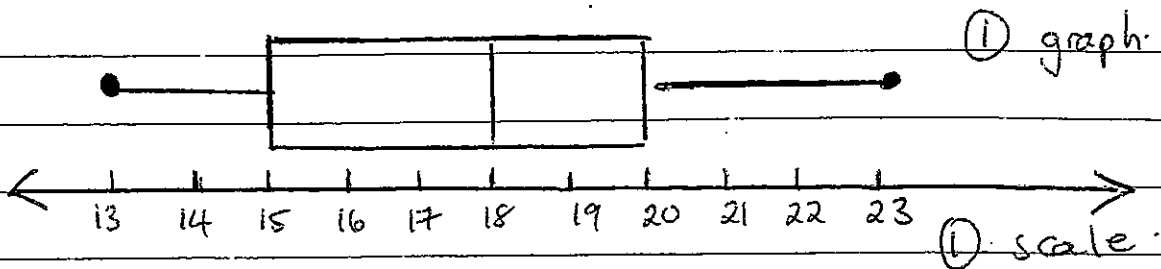
(ii) 48 months (1)

(iii) \$2900 (1)

Question 24 13 marks ³

(a) (i) $P(< 12) = \frac{3}{12} = \frac{1}{4}$ (1)

(ii)



(iii) $IQR = 20 - 15 = \underline{5 \text{ kg}}$ (1)

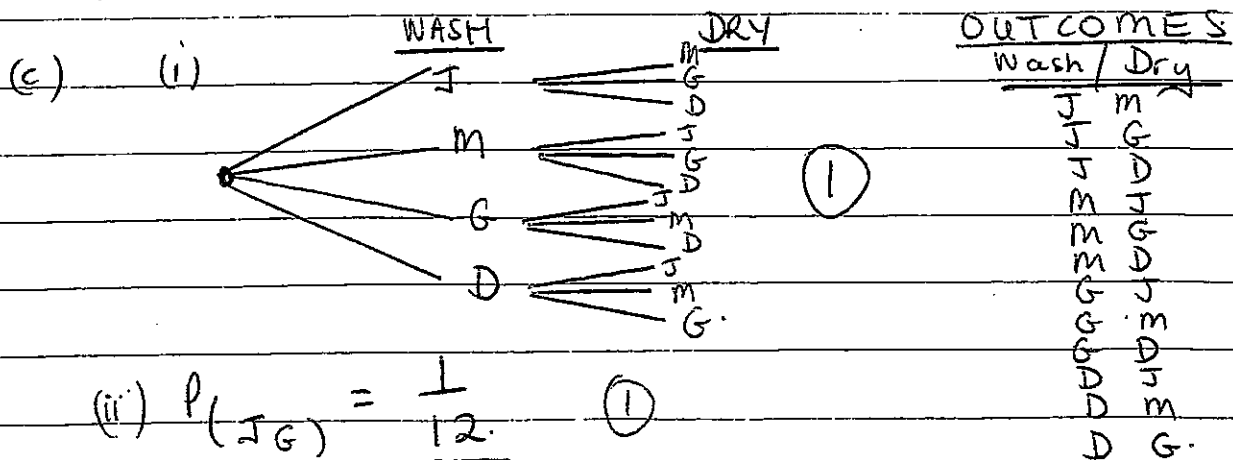
(b) (i) $A = 3$ (1)

$B = \underline{180}$ (1)

(i) 200 people (1)

(ii) $27 + 17 = \frac{44}{200}$ (1)

(iv) $\frac{13}{170} \times 100\% = \underline{7.64\%}$ (1)



(ii) $P(JG) = \frac{1}{12}$ (1)

(iii) $P(\text{David neither}) = \frac{6}{12} = \frac{1}{2}$ (1)

Question 25. 13 marks.

4

i) (i) $\angle QAR = 209^\circ - 140^\circ$
 $= \underline{69^\circ}$

(C) (i) The inner diameter of the pipe is:
 $17\text{cm} - 3\text{cm} = \underline{14\text{cm}}$

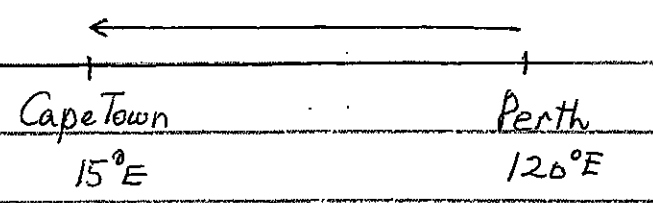
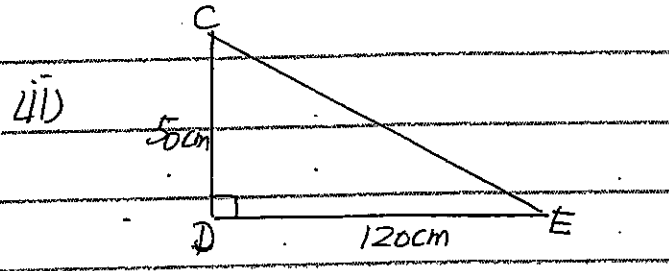
ii) $(QR)^2 = 42^2 + 39^2 - 2 \times 42 \times 39 \cos 69^\circ$
 $(QR)^2 = 2110$
 $QR = \underline{45.9\text{m}}$ (1 d.p.)

ii) The area of the shaded annulus
 $A = \pi(R^2 - r^2)$
 $= \pi(8.5^2 - 7^2)$
 $= \pi(72.25 - 49)$
 $= \pi \times 23.25$
 $= 73.0420292\text{cm}^2$
 $= \underline{73.0\text{cm}^2}$ (3.s.f.)
 (MUST BE ROUNDED CORRECTLY.)

iii) Area of $\triangle QAR$
 $= \frac{1}{2}(42 \times 39) \sin 69^\circ$
 $= \underline{764.6\text{m}^2}$

(b) (i) $\triangle CDE$ and $\triangle BAE$ are similar.

(d) (i) The difference between Perth and Cape Town



$(CE)^2 = 50^2 + 120^2$
 $= 16900$
 $CE = \underline{130\text{cm}}$

$120^\circ - 15^\circ = 105^\circ$
 Time difference = $105^\circ \times 4 = 420\text{min}$
 $= \underline{7\text{hours}}$

ii) Since $\triangle CDE$ is similar to $\triangle BAE$

OR $\frac{105^\circ}{15} = \underline{7\text{hours}}$

$\frac{BE}{BA} = \frac{CE}{CD}$

iii) $4\text{pm} - 7\text{hours}$
 $= \underline{9\text{am}}$ in Cape Town

$\frac{BE}{125\text{cm}} = \frac{130\text{cm}}{50\text{cm}}$

$BE = \frac{130 \times 125\text{cm}}{50}$
 $= \underline{325\text{cm}}$

iii) $6\text{am} + 7\text{hours} + 8\text{hours}$
 $= \underline{9\text{pm}}$ in Perth

\therefore The plank is 3.25 metres long

Question 26.

13 marks

5

(a) (i)	Number ^(x) of Children	frequency ^(f)	fx
	1	3	3
	2	7	14
	3	9	27
	4	3	12
	5	2	10
			$\Sigma fx = 66$

(iv) Petra would be selected since she has the smaller average time and smaller S.D., which means her times are more consistent she also has a smaller range

(d) The area of the ellipse

$$A = \pi ab$$

$$= \pi \times 147.5 \times 10^6 \times 152.6 \times 10^6$$

$$= 7.07 \times 10^{16} \text{ km}^2$$

(ANSWER MUST BE IN SCIENTIFIC NOTATION)

(ii) Mean = 2.75

(iii) Standard deviation = 1.1 (1 d.p.)

(b) (i) Negative moderate correlation.

(ii) The older the driver, the fewer the number of speeding fines.

(c) (i) Katrina 10.99 seconds.

(ii) Range (Petra) = $14.66 - 11.27$
 $= 3.39 \text{ secs}$

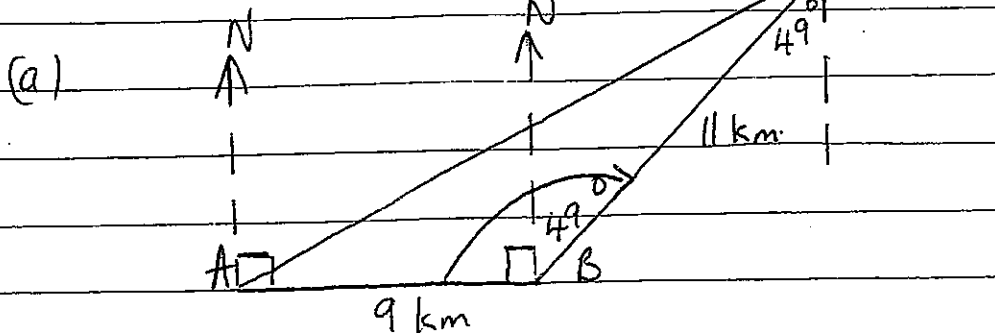
Range (Katrina) = $15.98 - 10.99$
 $= 4.99 \text{ secs}$

Petra has smallest range.

(iii) Petra: Mean = 12.92
S.D. = 1.23

Katrina: Mean = 13.53
S.D. = 2.17

Question 27 13 marks.



(i) $\angle ABC = 90 + 49 = 139^\circ$ (MUST SHOW CALCULATION) ①

(ii) $AC^2 = 9^2 + 11^2 - 2 \times 9 \times 11 \times \cos 139^\circ$ ①

$AC^2 = 351.43249...$

$AC = 18.746... = 18.7$ km to 1 decimal place ①

(iii) bearing of B from C = $180^\circ + 49^\circ = 229^\circ$ ①

(b)(i) $BC^2 = 20^2 - 12^2$

$BC^2 = 256$

$BC = 16$ ①

\therefore Perimeter of $\triangle ABD = 20 + 13 + 5 + 16 = 54$ cm ①

(ii) $\sin \angle ABC = \frac{12}{20}$ ①

$\angle ABC = 36^\circ 52'$ ① (MUST BE ROUNDED CORRECTLY.)

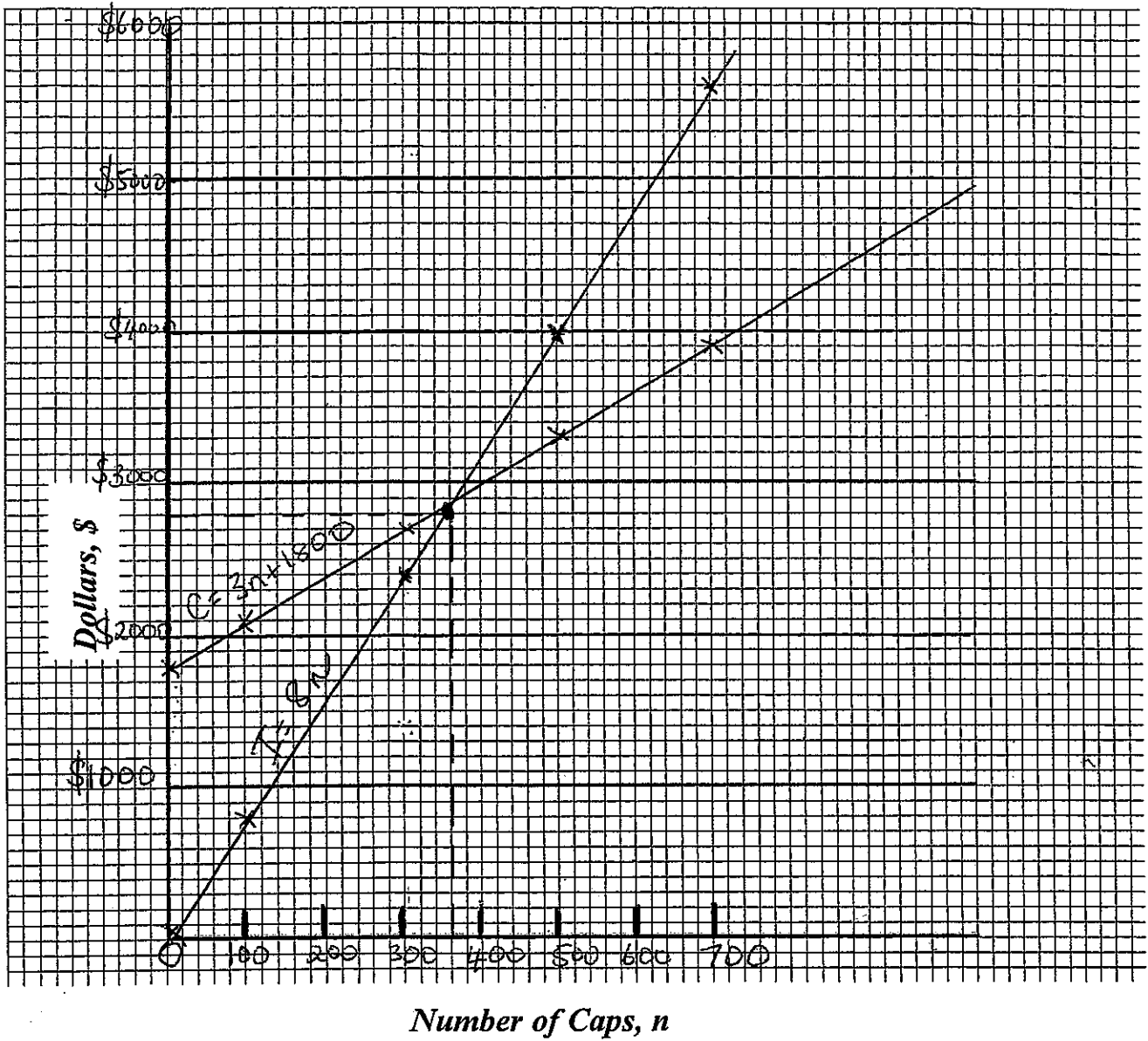
(c)(i) AREA ABFE = $\frac{1}{3} \times \frac{120}{3} (70 + 4 \times 21 + 50)$ ①
 $= 8160$ m²

(ii) Area of lake = $(240 \times 127) - 8160 - \left[\frac{120}{3} (57 + 4 \times 54 + 77) \right]$
 $= 30480 - 8160 - 14000$
 $= 8320$ m² ①

Complete Question 28(b) (iii) on this page

8/11

SCOTTY'S SPORTS CAPS – COST AND INCOME



Marking: Cost graph (with label) 1
 Income graph (with label) 1
 Scales correctly labelled 1

3

Question 28 13 marks

(a) (i) $SA = (67 \times 67) + (4 \times 5 \times 67)$ ①
 $= 5829 \text{ cm}^2$ ①

(ii) (α) side length = 5 cm ①

(β) $A = (S + 2h)^2$

$A = (67 + 2 \times 5)^2$ ① (correct substitution for S and h)

$A = 77^2$

$A = 5929 \text{ cm}^2$ ①

(b) (i) $C = 3n + 1800$

n	0	100	300	500	700
C	1800	2100	2700	3300	3900

① if all correct

(ii) $I = 8 \cdot n$

n	0	100	300	500	700
I	0	800	2400	4000	5600

① if all correct

(see page 8)

(iii) Graph: Cost graph ① Income graph ① Scales, labels. ①

"Use the graphs" means to show CONSTRUCTION LINES.

(α) (The point (360, 2880) is the POINT OF INTERSECTION of the 2 graphs. It is the BREAK-EVEN POINT ① for Scotty's business, when the Cost equals the Income.

(β) 360 caps (must show construction lines on graph) ①

(iv) If Scotty sells only 500 caps a month he will make a profit of only \$700 per month or \$175 per week. This is not a good decision as this income does not make it worthwhile to run his business. ①

(A statement backed up by statistics)