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Student Number

Mathematics General 2

2015 YEAR 12 TRIAL HSC EXAMINATION

Staff Involved:

AM FRIDAY 31st JULY

- PJR* • DZP*
- AXD • TE
- LAK • VAB
- JWH • AJD

Number of copies: 165

General Instructions

- Reading time - 5 minutes
- Working time - $2\frac{1}{2}$ hours
- Write using black or blue pen
Black pen is preferred
- Board-approved calculators may be used
- A formulae and data sheet is provided at the back of this paper
- In Questions 26 – 30, show relevant mathematical reasoning and/or calculations

Total marks – 100

Section I

Page 2 – 10

25 marks

- Attempt Questions 1 – 25
- Allow about 35 minutes for this section

Section II

Pages 11 – 32

75 marks

- Attempt Questions 26 – 30
- Allow about 1 hours 55 minutes for this section

Section I

25 marks

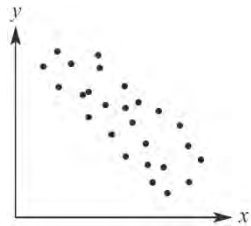
Attempt Questions 1 – 25

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1– 25.

Choose the best response and fill in the corresponding response oval completely.

- 1** What is the correlation between the variables in this scatterplot?



- (A) Weak positive
(B) Weak negative
(C) Strong positive
(D) Strong negative
- 2** There are 24 competitors in a cycling race.
How many different selections are possible for first and second place?
Assume there are no dead heats.
- (A) 47
(B) 276
(C) 552
(D) 576
- 3** Expand and simplify $6x^2(x^2 - 1) + 2x^2$
- (A) $6x^4 + 2x^2 - 1$
(B) $6x^4 - 4x^2$
(C) $6x^4 + 8x^2$
(D) $6x^4 + 4x^2$

- 4 The cost of a mobile phone including GST is \$280.

What is the GST payable on this mobile phone?

- (A) \$25.45
- (B) \$28
- (C) \$252
- (D) \$254.54

- 5 The table shows the monthly repayments per \$1000 on a personal loan.

Term of loan	6.00%	6.25%	6.50%	6.75%
5	\$19.33	\$19.45	\$19.57	\$19.68
10	\$11.10	\$11.23	\$11.35	\$11.48
15	\$8.44	\$8.57	\$8.71	\$8.85
20	\$7.16	\$7.31	\$7.46	\$7.60

What is the monthly repayment for a loan of \$240 000 at 6.5% p.a. interest over 20 years?

- (A) \$7.46
- (B) \$149.20
- (C) \$1790.40
- (D) \$35 808.00

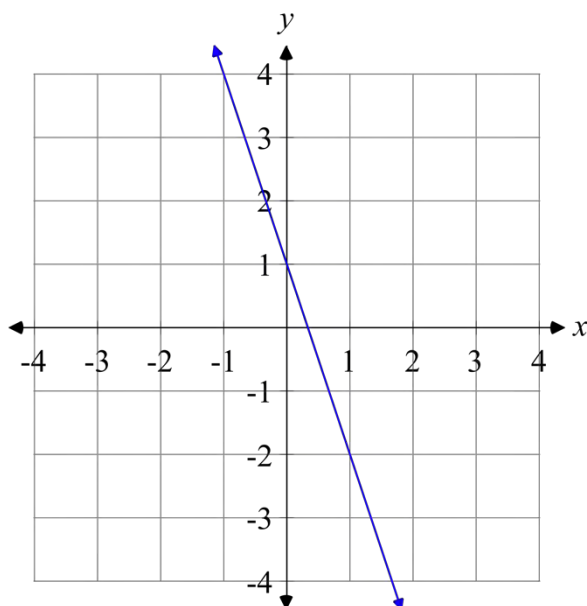
- 6 A set of 13 scores has a median of 11.

The scores 6, 7, 12 and 18 are added to the data set.

Which of the following summary statistics is unaffected?

- (A) interquartile range
- (B) median
- (C) mean
- (D) standard deviation

- 7 What is the correct equation of the line shown below?



- (A) $y = -3x + 1$
- (B) $y = \frac{1}{3}x + 1$
- (C) $y = 3x + 1$
- (D) $y = -\frac{1}{3}x + 1$
- 8 The cost $\$C$ of a birthday party is given by $C = 50n + 135$ where n is the number attending the party.
- If five people decide not to attend, by how much does the cost decrease?
- (A) \$135
- (B) \$185
- (C) \$250
- (D) \$385

- 9 A group of six students completed a test.

The mean for the group on this test was 15.

However, one of the scores had been incorrectly recorded as a 10 instead of 20.

What is the correct mean?

- (A) 13.3
- (B) 14.2
- (C) 16.7
- (D) 18.3

- 10 Amelia spent the following amounts on the given food in one week.

Groceries	\$98
Meat and fish	\$67
Milk and dairy	\$53
Fruit and vegetables	\$27
Other	\$25

Amelia would like to display the information in a sector graph.

What size angle is needed to represent fruit and vegetables?

- (A) 9°
- (B) 13°
- (C) 27°
- (D) 36°

- 11 A cone has a diameter of 5 cm and a height of 13 cm. What is its volume?

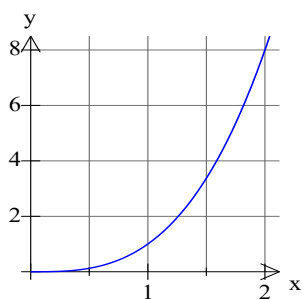
- (A) 85 cm^3
- (B) 255 cm^3
- (C) 340 cm^3
- (D) 1021 cm^3

12 Which of the following represents 0.5 terabytes using standard notation?

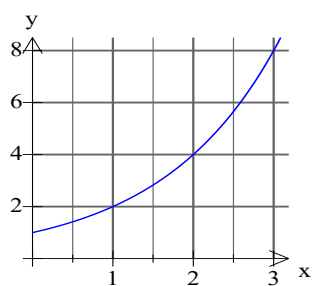
- (A) 5.5×10^8 B
- (B) 5.0×10^8 B
- (C) 0.55×10^{12} B
- (D) 5.5×10^{11} B

13 Which graph best represents $y = 2^x$?

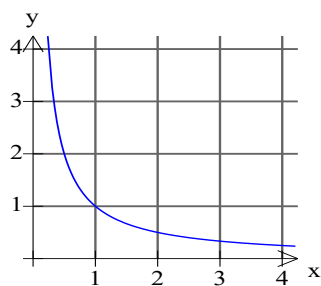
(A)



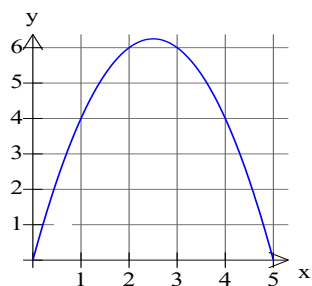
(B)



(C)



(D)



14 If $p = 2q^3 - 1$, what is the value of q when p is 13?

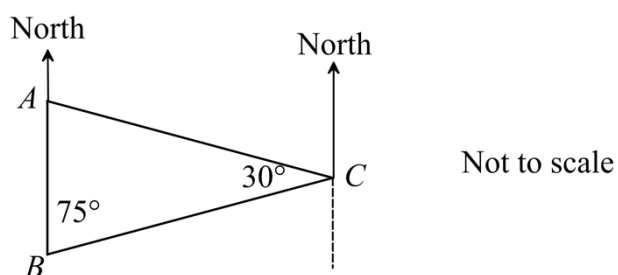
- (A) $\sqrt[3]{6}$
- (B) $\sqrt[3]{7}$
- (C) $\frac{\sqrt[3]{14}}{2}$
- (D) 4 393

- 15 Two unbiased coins are tossed together 30 times.

Which calculation shows the expected number of times you would get two heads?

- (A) $\frac{1}{2} \times 60$
(B) $\frac{1}{4} \times 60$
(C) $\frac{1}{2} \times 30$
(D) $\frac{1}{4} \times 30$

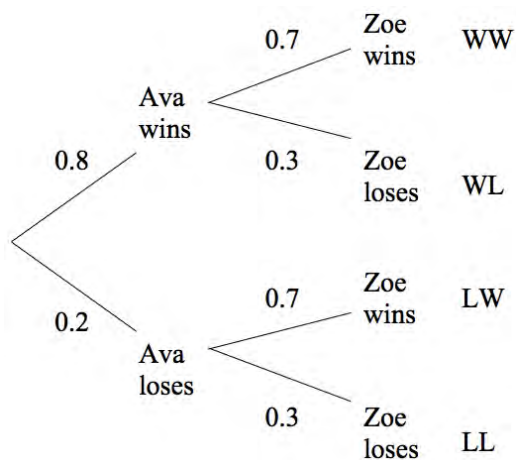
- 16 What is the bearing of A from C?



- (A) 075°T
(B) 105°T
(C) 255°T
(D) 285°T
- 17 What is the amount of interest paid on a \$194 000 investment over 25 years if the interest rate charged is 6.7% p.a. compounding annually? Answer to the nearest dollar.

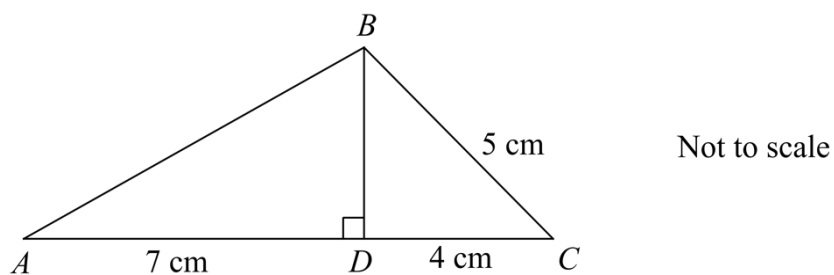
- (A) \$324 950
(B) \$518 950
(C) \$787 550
(D) \$981 550

- 18** Ava and Zoe are competing in two different cycling races. The probability that Ava wins her race is 0.8 and the probability that Zoe wins her race is 0.7. The probability tree diagram below shows this information.



What is the probability that only one of Ava and Zoe will be successful?

- (A) 0.14
(B) 0.24
(C) 0.38
(D) 0.62
- 19** What is the length of AB ?



- (A) 7.1 cm
(B) 7.6 cm
(C) 9.5 cm
(D) 9.8 cm

- 20** Millie's car uses 7.25 litres of petrol per 100 km.

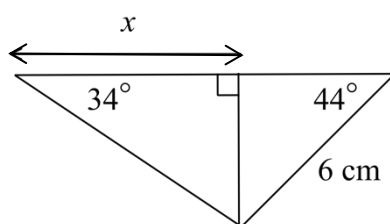
How many litres of petrol will her car use on a trip of 310 km from Bulahdelah to Wollongong?

- (A) 2.339 L
- (B) 22.475 L
- (C) 42.759 L
- (D) 427.586 L

- 21** Riley bought a new car for \$40 500. In the first year, the value of the car depreciated by 15%. In the second year, the car depreciated by 10%. In the third year, the value depreciated by 8%. At the end of the third year, what was the percentage value of the car based on its original sale price?

- (A) 33%
- (B) 67%
- (C) 70%
- (D) 95%

- 22** What is the value of x in the diagram below?



Not to scale

- (A) $\frac{6 \sin 44^\circ}{\tan 34^\circ}$
- (B) $6 \sin 44^\circ \sin 34^\circ$
- (C) $\frac{6 \tan 34^\circ}{\sin 44^\circ}$
- (D) $\frac{6}{\sin 34^\circ \sin 44^\circ}$

23 Which equation correctly shows r as the subject of $S = 500(1 - r)$?

(A) $r = \frac{S}{500} + 500$

(B) $r = \frac{S - 500}{500}$

(C) $r = 500 - \frac{S}{500}$

(D) $r = 1 - \frac{S}{500}$

24 What is the point of intersection of the lines $y = x + 4$ and $y = -x - 4$?

(A) $(-4, 0)$

(B) $(-4, -8)$

(C) $(0, -4)$

(D) $(4, 8)$

25 Forty Year 12 students were surveyed to find out how many hours of sport they play per week, (to the nearest hour). The results are shown in the frequency table below.

<i>Hours per week</i>	<i>Frequency</i>
0 – 2	10
3 – 5	20
6 – 8	6
9 – 11	4

What is the relative frequency of students who played more than five hours of sport?

(A) $\frac{1}{4}$

(B) $\frac{1}{2}$

(C) $\frac{3}{20}$

(D) 10

End of Section I

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Student Number

**2015
YEAR 12
TRIAL HSC
EXAMINATION**

Mathematics General 2

Section II

75 marks

Attempt Questions 26 – 30

**Allow about 1 hour and 55 minutes
for this section.**

Answer the questions in the spaces
provided.

Your responses should include relevant
mathematical reasoning and / or
calculations.

Extra writing space is provided on page 33.
If you use this space, clearly indicate which
question you are answering.

Write your Barker College assessment
number at the top of each page.

Please turn over

Question 26 (15 marks)

- (a) What is the value of $\sqrt{\frac{m+3n}{4n}}$ if $m = 5.9$ and $n = 2.4$? **2**

Answer correct to two significant figures.

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- (b) Medicine is given as a concentration of 350 mg per 100 mL. **1**
What is the dosage rate for this medicine in g/mL?

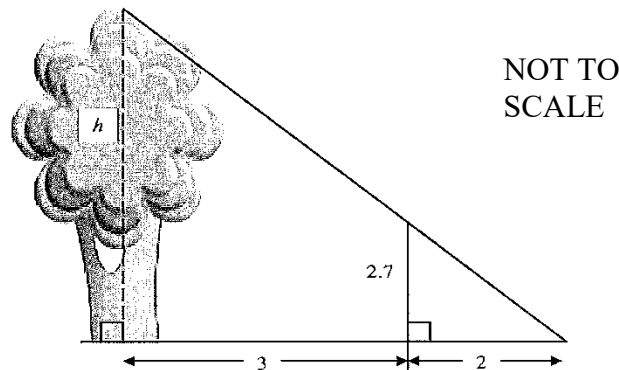
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- (c) Find the height of the tree in the diagram below. All measurements are in metres. **1**



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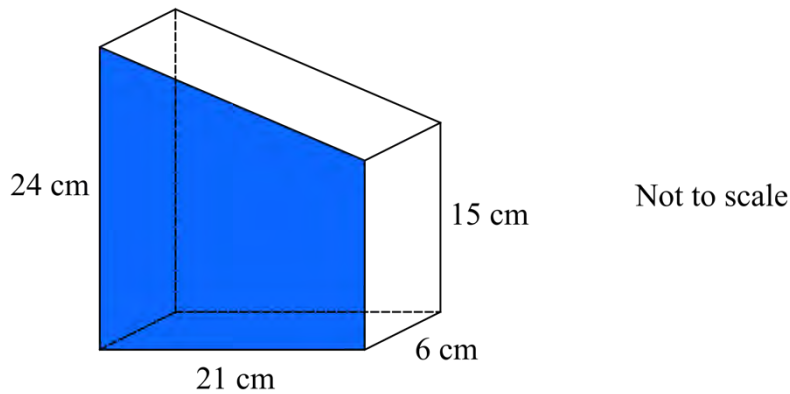
Question 26 continues on page 13

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Student Number

Question 26 (continued)

- (d) The magazine holder below has four sides and a base. It is open at the top.



- (i) Show that the area of the shaded side is 409.5 cm^2 1

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- (ii) Calculate the surface area of the magazine holder. 2

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- (iii) The magazine holder is to be made from heavy duty cardboard. 2

The cost of this type of cardboard is \$4.29 per square metre.

What is the cost of making fifty of these magazine holders (to nearest cent)?

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Question 26 continues on page 14

Question 26 (continued)

- (e) The table below shows the present value of a \$1 annuity.

Present value of \$1 annuity					
Period	1%	2%	4%	6%	8%
1	0.9901	0.9804	0.9615	0.9434	0.9259
2	1.9704	1.9416	1.8861	1.8334	1.7833
3	2.9410	2.8839	2.7751	2.6730	2.5771
4	3.9020	3.8077	3.6299	3.4651	3.3121
5	4.8534	4.7135	4.4518	4.2124	3.9927

- (i) What would be the present value of a \$9 000 per year annuity at 6% per annum for 5 years, with interest compounding annually? 1

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- (ii) An annuity of \$6000 every three months is invested at 4% per annum, compounded quarterly for 1 year. What is the present value of this annuity? 1

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- (iii) What is the regular payment that would provide a present value of \$43 230 over 3 years at 8% per annum compound interest? Answer to the nearest dollar. 1

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Question 26 continues on page 15

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Student Number

Question 26 (continued)

- (f) Tim weighs 75 kg and has bought a six-pack of an alcoholic beverage to drink at a party. **3**
If each drink in this six-pack is one standard drink, what is the minimum length of time over which he must consume all six drinks in order to have a blood alcohol content (BAC) reading of less than 0.05 at the end of the party? (Answer to the nearest 10 minutes)

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End of Question 26

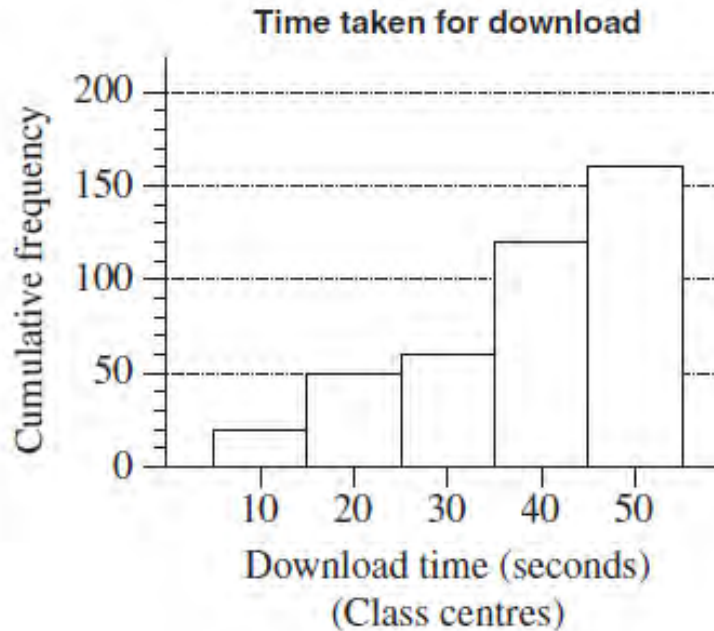
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Student Number

Question 27 (15 marks)

- (a) James recorded the times for 160 music downloads, grouped them into classes and then displayed this information using the cumulative frequency histogram shown below.



- (i) Using the graph above, estimate the median 2

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- (ii) Use the graph to estimate the interquartile range 2

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- (iii) James said “There were about 10 downloads that took exactly 30 seconds” 1

Is he correct? Give a reason for your answer.

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Question 27 continues on page 18

Question 27 (continued)

- (b) A table of home loan repayments for a \$390 000 loan is shown below.

Amount borrowed		\$390 000	Monthly repayment (R) = \$2100	
Annual interest rate (r)		6.15% p.a.		
Month (n)	Principal P	Interest I	$P + I$	$P + I - R$
1	\$390 000.00	\$1998.75		
2				

- (i) What is the amount owing at the beginning of the second month? 1

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- (ii) How much of the initial loan had been paid off during the first two months? 2

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- (c) Solve the equation $\frac{1}{2}a + 4 = \frac{5a - 6}{3}$ 3

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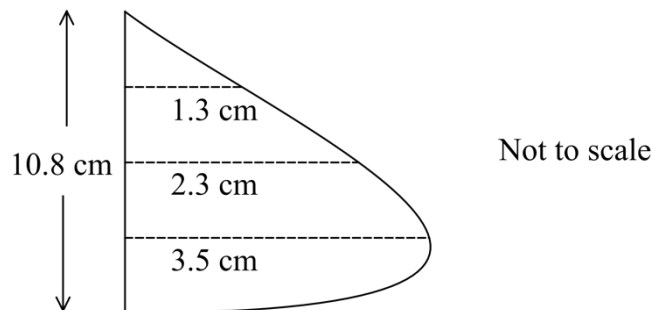
Question 27 continues on page 19

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Student Number

Question 27 (continued)

- (d) The diagram shows the common cross-section of a carved block of wood 0.5 metres long.



Use Simpson's rule twice to determine an approximation for the area of the cross-section (giving your answer to one decimal place)

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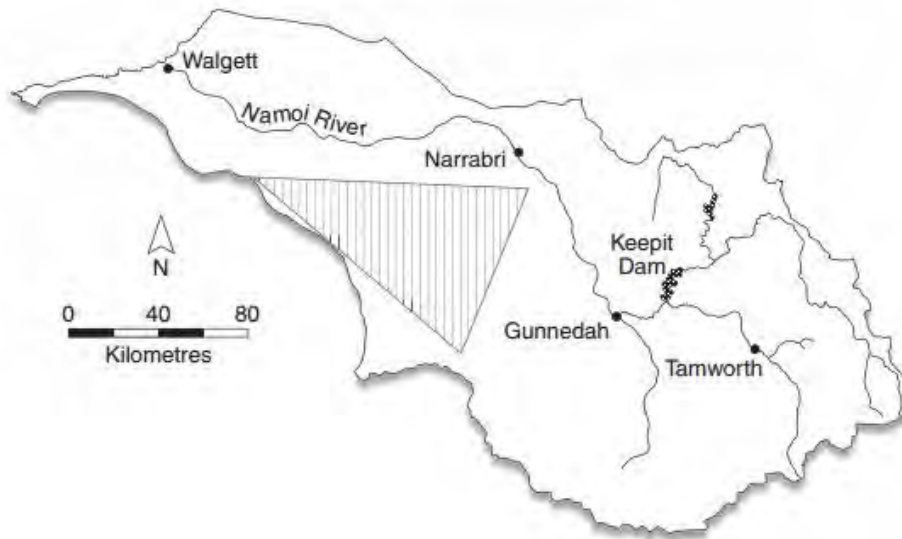
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Question 27 continues on page 20

Question 27 (continued)

- (e) The diagram shows a map of the Namoi catchment area in NSW.
The shaded area has been designated for forestry conservation.



Melinda flies a plane directly from Tamworth to the northwest corner of this forestry conservation area.

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Using the scale given, determine the length of her journey.

Give your answer to the nearest kilometre.

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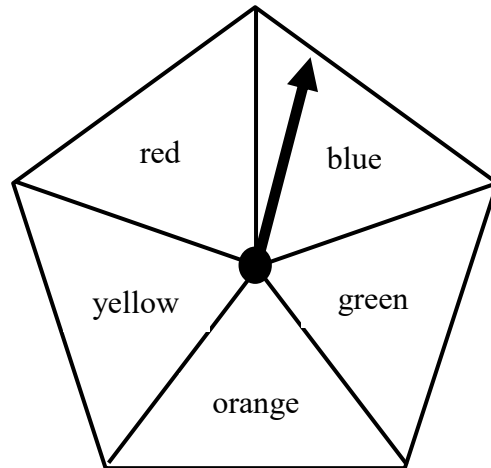
End of Question 27

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Student Number

Question 28 (15 marks)

- (a) The arrow on this regular pentagon is spun twice.
 The result is recorded as either blue, green, orange, yellow or red.
 Behind two of the colours, there is a prize of \$500.



- (i) What is the probability of winning \$500 on the very first spin? **1**

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- (ii) What is the probability of winning \$500 on the second spin only? **1**

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- (iii) What is the probability of winning at least \$500 after the two spins? **1**

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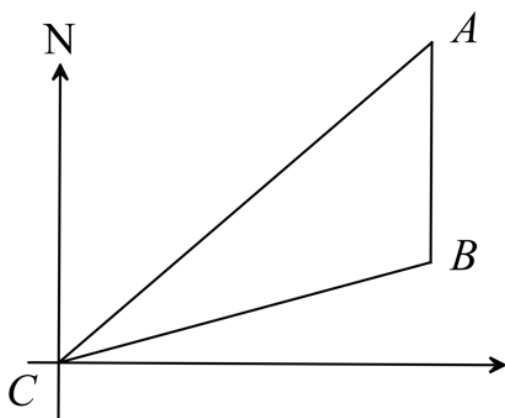
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Question 28 continues on page 22

Question 28 (continued)

- (b) Toby travels 27 km from point C to point A on a bearing of 049°T .
He then changes direction and travels due south for 12 km to point B .



Not to scale

- (i) What is the size of $\angle CAB$? 1

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- (ii) Calculate the length of BC (correct to the nearest metre). 2

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- (iii) What is the area $\triangle CAB$? 1

Give your answer correct to two decimal places.

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Question 28 continues on page 23

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Student Number

Question 28 (continued)

(c) The weight (in kilograms) of twelve bags of wood are listed below.

9 10 11 11 16 17 21 26 30 36 39 41

- (i) Determine the five number summary for this data. **2**

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- (ii) Construct a box-and-whisker plot for this data on the grid below, displaying an appropriate scale. **1**

- (iii) Describe the skewness of this distribution **1**

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Question 28 continues on page 24

Question 28 (continued)

- (d) The time taken (t in hours) to complete a journey is inversely proportional to the average speed (s km/h). 2

A car takes four hours to complete a journey at an average speed of 65 km/h.

Find the time taken to complete a journey if the car travels at an average speed of 80 km/h.

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- (e) Solve these equations simultaneously, showing all working. 2

$$5x - 4y = 20$$

$$3x - 4y = 12$$

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End of Question 28

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Student Number

Question 29 (15 marks)

- (a) The table below shows Lola's average water usage per day.

Water usage	L/day
Shower	95
Washing machine	120
Toilet	86
Other	49

- (i) How many kilolitres of water does Lola use in a year?

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- (ii) Lola is charged \$2.115 per kL for water usage.

1

What is the cost of her water usage for the toilet in a year?

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- (b) A truck is bought by a local council for \$120 000. It depreciates at 16% p.a.

1

Using the declining balance formula, find the total loss in value of the truck over the first three years of use.

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Question 29 continues on page 26

Question 29 (continued)

- (c) A raffle ticket can be bought for \$10 each. There are 100 tickets in the raffle. 2

There is one first prize of \$500

There are five second prizes of \$50 each.

There is one mystery prize.

How much is the mystery prize if the raffle is to have a financial expectation of zero?

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- (d) Alice was driving her car at 40 km/h through a school zone. 2

A school student suddenly ran onto the road 15 metres in front of her.

If her reaction time is 0.50 seconds and her braking distance was 7.9 metres, was Alice able to stop her car without hitting the child? Show calculations to support your answer.

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Question 29 continues on page 27

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Student Number

Question 29 (continued)

- (e) Data was collected from 16 students on the number of text messages they sent on Monday. This data is displayed in the following stem-and-leaf plot.

Stem	Leaf
0	7 8
1	1 1 2 3 5 5 6
2	0 3 5 9
3	0 2
4	9

- (i) What is the interquartile range of the data? **2**

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- (ii) Is 49 an outlier for this set of data? Justify your answer with suitable calculations. **1**

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- (iii) The number of text messages sent by the same 16 students on the following day (Tuesday) were collected and organised. **2**

The following five number summary was generated from this second set of data:

8 12 14 28 51

Compare and contrast the two data sets by referring to measures of location and spread.

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Question 29 continues on page 28

Question 29 (continued)

- (f) Sarah is 20 years old and has received this quote for comprehensive car insurance.

Premium details	Excesses	Cost
12 month policy	Standard	\$500
Basic premium \$678	Male under 21	\$1200
plus		
30% No claim bonus	Female under 21	\$900

- (i) Calculate the cost of her quote. 1

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- (ii) Sarah's car is valued at \$16 980 by the insurance company. 2

To register her car for a year, she must also pay the following:

Safety check	\$35
Compulsory third-party insurance	\$498
Registration	2% of the current value of the car
GST	10% of the total of safety check, compulsory third party and registration

Find the total amount that Sarah must pay in order to have her car registered and comprehensively insured using the above quote.

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End of Question 29

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Student Number

Question 30 (15 marks)

- (a) Darren's bucket is initially filled with 4 litres of water.

Sadly, the bucket has a hole in its base and is leaking at a rate of 20 millilitres per minute.

- (i) Write a linear equation in the form $V = mt + b$ to describe this situation 1

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- (ii) What volume of water remains after 150 seconds? 1

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- (iii) How long would it take for all the water to leak out? 1

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- (b) Jack has a mobile phone contract that charges a monthly access fee of \$79 with 1
included calls worth \$250, a call connection fee of \$0.35 and call rate of \$0.45 per
30 second or part thereof.

What is the monthly charge if Jack made 300 calls, each with duration less than 30 seconds?

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Question 30 continues on page 30

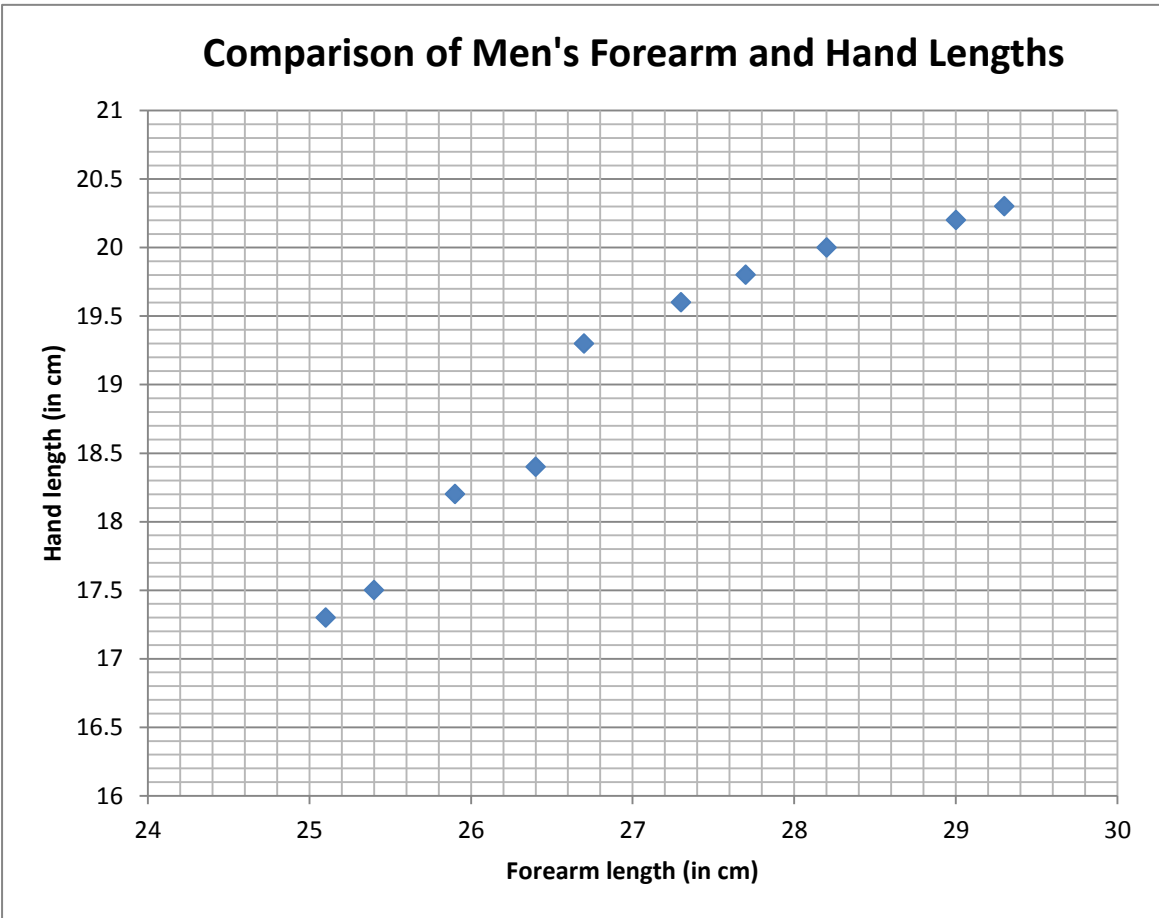
Question 30 (continued)

- (c) Matthew investigated a comparison between the forearm length and hand length of 10 male friends.

His results were recorded in the table below. All lengths are in centimetres.

Forearm length (x)	25.1	25.4	25.9	26.4	26.7	27.3	27.7	28.2	28.8	29.3
Hand length (y)	17.3	17.5	18.2	18.4	19.3	19.6	19.8	20.0	20.2	20.3

He used the data to produce the scatterplot below.



- (i) Find the correlation coefficient (correct to two decimal places) and explain what this indicates about the relationship between forearm length and hand length.

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Question 30 continues on page 31

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Question 30 (continued)

Student Number

- (ii) Complete the table below by calculating the mean, $\bar{y}$, and standard deviation σ_y for the hand length data (correct to two decimal places). **2**

	Mean	Standard Deviation
Forearm length	$\bar{x} = 27.08$	$\sigma_x \approx 1.35$
Hand length	$\bar{y} =$	$\sigma_y \approx$

- (iii) Using the figures in this table, prove the equation of the least squares line of best fit is:

$$y = 0.75x - 1.25 \quad \mathbf{2}$$

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- (iv) Use the equation to predict the hand length when the forearm length is 24cm. **1**

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- (v) Sketch the least squares line of best fit onto the scatter plot presented on page 30. **1**

- (vi) Can Matthew use this line of best fit to predict the hand length of his sister who has forearm length of 15cm? Explain your answer. **1**

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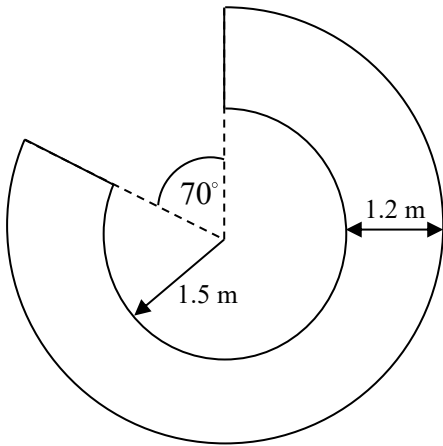
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Question 30 continues on page 32

Question 30 (continued)

- (d) The diagram below shows a garden bed in the shape of an annulus with a sector removed.



Find the perimeter of this unusual garden bed. 2
Give your answer in metres correct to two decimal places.

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End of Paper

Section II Extra writing space

If you use this space, clearly indicate which question you are answering.

[illegible]

MATHEMATICS GENERAL 2

FORMULAE AND DATA SHEET

Financial Mathematics

Simple Interest

$$I = Prn$$

P is initial amount

r is interest rate per period, expressed as a decimal

n is number of periods

Compound Interest

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

A is final amount

P is initial amount

r is interest rate per period, expressed as a decimal

n is number of compounding periods

Present value and future value

$$PV = \frac{FV}{(1 + r)^n}, \quad FV = PV(1 + r)^n$$

r is interest rate per period, expressed as a decimal

n is number of compounding periods

Straight-line method of depreciation

$$S = V_0 - Dn$$

S is salvage value of asset after n periods

V_0 is initial value of asset

D is amount of depreciation per period

n is number of periods

Declining-balance method of depreciation

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

S is salvage value of asset after n periods

V_0 is initial value of asset

r is depreciation rate per period, expressed as a decimal

n is number of periods

Data Analysis

Mean of a sample

$$\bar{x} = \frac{\text{sum of scores}}{\text{number of scores}}$$

z-score

For any score x ,

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

$\bar{x}$ is mean

s is standard deviation

Outlier(s)

score(s) less than $Q_L - 1.5 \times IQR$

or

scores(s) more than $Q_U + 1.5 \times IQR$

Q_L is lower quartile

Q_U is upper quartile

IQR is interquartile range

Least-squares line of best fit

$$y = \text{gradient} \times x + y\text{-intercept}$$

$$\text{gradient} = r \times \frac{\text{standard deviation of } y \text{ scores}}{\text{standard deviation of } x \text{ scores}}$$

$$y\text{-intercept} = \bar{y} - (\text{gradient} \times \bar{x})$$

r is correlation coefficient

$\bar{x}$ is mean of x scores

$\bar{y}$ is mean of y scores

Normal distribution

- approximately 68% of scores have z -scores between -1 and 1
- approximately 95% of scores have z -scores between -2 and 2
- approximately 99.7% of scores have z -scores between -3 and 3

Spherical Geometry

Circumference of a circle

$$C = 2\pi r \text{ or } C = \pi D$$

r is radius

D is diameter

Arc length of a circle

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

r is radius

θ is number of degrees in central angle

Radius of Earth

(taken as) 6400 km

Time differences

For calculation of time differences using longitude: $15^\circ = 1$ hour time difference

Area

Circle

$$A = \pi r^2$$

r is radius

Sector

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

r is radius

θ is number of degrees in central angle

Annulus

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

R is radius of outer circle

r is radius of inner circle

Trapezium

$$A = \frac{h}{2}(a + b)$$

h is perpendicular height

a and b are the lengths of the parallel sides

Area of land and catchment areas

unit conversion: 1 ha = 10 000 m²

Surface Area

Sphere

$$A = 4\pi r^2$$

r is radius

Closed cylinder

$$A = 2\pi r^2 + 2\pi rh$$

r is radius

h is perpendicular height

Volume

Prism or cylinder

$$V = Ah$$

A is area of base

h is perpendicular height

Pyramid or cone

$$V = \frac{1}{3} Ah$$

A is area of base

h is perpendicular height

Volume and capacity

unit conversion: 1 m³ = 1000 L

Approximation Using Simpson's Rule

Area

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

h is distance between successive measurements

d_f is first measurement

d_m is middle measurement

d_l is last measurement

Volume

$$V \approx \frac{h}{3} (A_L + 4A_M + A_R)$$

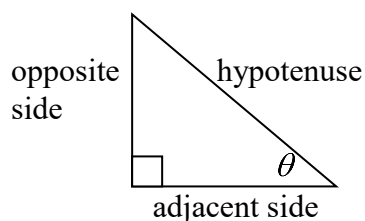
h is distance between successive measurements

A_L is area of left end

A_M is area of middle

A_R is area of right end

Trigonometric Ratios



$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

Sine rule

In $\triangle ABC$,

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

Area of a triangle

In $\triangle ABC$,

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

Cosine Rule

In $\triangle ABC$,

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

or

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

Units of Memory and File Size

1 byte = 8 bits

1 kilobyte = 2^{10} bytes = 1024 bytes

1 megabyte = 2^{20} bytes = 1024 kilobytes

1 gigabyte = 2^{30} bytes = 1024 megabytes

1 terabyte = 2^{40} bytes = 1024 gigabytes

Blood Alcohol Content Estimates

$$BAC_{\text{male}} = \frac{10N - 7.5H}{6.8M}$$

or

$$BAC_{\text{female}} = \frac{10N - 7.5H}{5.5M}$$

N is number of standard drinks consumed

H is number of hours of drinking

M is person's mass in kilograms

Distance, Speed and Time

$$D = ST, \quad S = \frac{D}{T}, \quad T = \frac{D}{S}$$

$$\text{average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$$

$$\text{stopping distance} = \left\{ \begin{array}{l} \text{reaction-time} \\ \text{distance} \end{array} \right\} + \left\{ \begin{array}{l} \text{braking} \\ \text{distance} \end{array} \right\}$$

Probability of an Event

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

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

Straight Lines

Gradient

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

Gradient-intercept form

$$y = mx + b$$

m is gradient

b is y-intercept

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GENERAL 2 TRIAL SOLUTIONS 2015

Multiple Choice.

1. D

2. C $24 \times 23 = 552$

3. B $6x^4 - 6x^2 + 2x^2 = 6x^4 - 4x^2$

4. A $280 \div 110 = 2.54$ $2.54 \times 10 = 25.45$

5. C $240 \times 7.46 = 1790.40$

6. B

7. A $y \text{ int} = 1$ $m = -\frac{3}{1}$
 $\therefore y = -3x + 1$

8. C $50 \times 5 = 250$

9. C $6 \times 15 - 10 + 20 = 100$ $100 \div 6 = 16.7$

10. D $\frac{27}{270} \times 360 = 36$

11. A $V = \frac{1}{3} \times \pi \times \left(\frac{5}{2}\right)^2 \times 13 = 85.08$

12. D $0.5 \times 1024 \times 1024 \times 1024 \times 1024$

13. B

14. B $13 = 2q^3 - 1$
 $14 = 2q^3$
 $7 = q^3$
 $q = \sqrt[3]{7}$

15. D

16. D $\angle BCS = 75$ (alt $\angle$'s $\parallel$)
 $180 + 75 + 30 = 285$

17. C $194000(1 + 0.067)^{25} = 981550$
 $981550 - 194000 = 787550$

18. C $(0.8 \times 0.3) + (0.2 \times 0.7) = 0.38$

19. B $BD^2 = 5^2 - 4^2$ $AB^2 = 7^2 + 3^2$
 $BD = 3$ $AB = 7.6$

20. B $7.25 \times \frac{310}{100} = 22.475$

21. C $40500 \times 0.85 \times 0.9 \times 0.92$
 $= 28503.90$
 $\frac{28503.90}{40500} = 0.70$

22. A let $y = \text{vertical line}$

$$y = 6 \sin 44$$

$$\tan 34 = \frac{6 \sin 44}{x}$$

$$x = \frac{6 \sin 44}{\tan 34}$$

23. D $\frac{s}{500} = 1 - r$ $r = 1 - \frac{s}{500}$

24. A $x + 4 = -x - 4$ $y = -4 + 4$
 $2x = -8$ $= 0$
 $x = -4$ $\therefore (-4, 0)$

25. A $\frac{10}{40} = \frac{1}{4}$

Section 2

26. a) $\sqrt{\frac{5.9 + 3 \times 2.4}{4 \times 2.4}} = 1.16815 = 1.2$

b) $350 \text{ mg} / 100 \text{ mL}$
 $0.35 \text{ g} / 100 \text{ mL}$
 $0.0035 \text{ g} / \text{mL}$

c) $\frac{h}{2.5} = \frac{5}{2}$ $h = 6.75$

d) i) $A = \frac{21}{2}(24 + 15) = 409.5$
 ii) $409.5 \times 2 = 819$
 $15 \times 6 = 90$

$21 \times 6 = 126$

$24 \times 6 = 144$

Total 1179

iii) $1179 \div 10000 = 0.1179 \text{ m}^2$

$0.1179 \times 50 \times 4.29 = \25.29

e) i) $9000 \times 4.2124 = \$37911.60$

ii) $6000 \times 3.9020 = \$23412$

iii) $x \times 2.5771 = 43230$
 $x = \$16775$

f) $0.05 = 10 \times 6 - 7.5H$

6.8×7.5

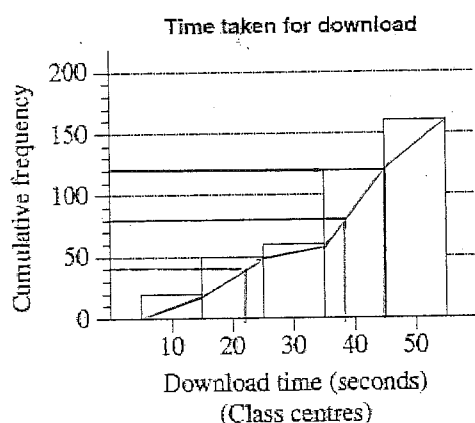
$25.5 = 60 - 7.5H$

$7.5H = 34.5$

$H = 4.6 \text{ hr} \rightarrow 4 \text{ hr } 36 \text{ min}$

$\therefore 4 \text{ hr } 40 \text{ min}$

27. a) i



i, 38 (accept 36-39)

ii, $45 - 22 = 23$ (accept 21-24)

iii, No as it is a grouped freq table we do not know what each download was exactly

b) i, 389898.75

ii, $390000 - 389796.98 = \$203.02$

c) $\frac{3}{2}a + 12 = 5a - 6$

$3a + 24 = 10a - 12$

$36 = 7a$

$a = \frac{36}{7}$

d) $A_1 = \frac{2.7}{3} (0 + 4 \times 1.3 + 2 \times 3) = 6.75$

$A_2 = \frac{2.7}{3} (2 \times 3 + 4 \times 3.5 + 0) = 14.67$

Total = 21.4 cm^2

e) meas = 6.6 cm scale 2.2 cm = 80 km

$6.6 \div 2.2 = 3$ $3 \times 80 = 240 \text{ km}$

28. a) i, $\frac{2}{5}$

ii, $\frac{3}{5} \times \frac{2}{5} = \frac{6}{25}$

iii, $1 - (\frac{3}{5} \times \frac{2}{5}) = \frac{16}{25}$

b) i, 49 (alt $\angle$ with $\angle CAB$)

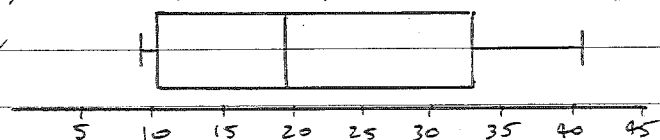
ii, $BC^2 = 27^2 + 12^2 - 2 \times 27 \times 12 \times \cos 49$

$BC = 21.16$

iii, $A = \frac{1}{2} \times 27 \times 12 \times \sin 49$
 $= 122.26 \text{ m}^2$

c) i, 9, 11, 19, 33, 41

ii,



iii, positively skewed

d) $t = \frac{k}{5}$

$4 = \frac{k}{65}$

$k = 260$

$t = \frac{260}{80}$

$= 3.25 \text{ hrs}$

e) $5x - 4y = 20$ — (1)

$3x - 4y = 12$ — (2)

(1) - (2)

$2x = 8$

$x = 4$

sub $x = 4$ into (1)

$5 \times 4 - 4y = 20$

$-4y = 0$

$y = 0$

$\therefore x = 4$

$y = 0$

29. a) i, $350 \times 365 = 127750 \text{ L}$

$= 127.75 \text{ kL}$

ii, $0.086 \times 365 = 31.39 \text{ kL}$

$31.39 \times 2.115 = \$66.39$

b) $A = 120000 (1 - 0.16)^3 = 71124.48$

$120000 - 71124.48 = \$48875.52$

$$c) \frac{1}{100} \times 500 + \frac{5}{100} \times 50 + \frac{1}{100} \times x - 10 = 0$$

$$7.5 + \frac{x}{100} = 10$$

$$\frac{x}{100} = 2.5$$

$$x = 250$$

$$d) 40 \text{ km/h} \rightarrow 40000 \text{ m/h} \rightarrow 11 \text{ m/sec}$$

$$\therefore 5.5 \text{ m}/\frac{1}{2} \text{ s}$$

$$5.5 + 7.9 = 13.4 \text{ m}$$

yes she will stop before the child

$$e) i) 27 - 11.5 = 15.5$$

$$ii) 27 + 1.5 \times 15.5 = 50.25$$

No as 49 is less than 50.25

iii) They are very similar as the medians only differ by 1.5 and the ranges only differ by 1

$$f) i) 678 \times 0.70 = \$474.60$$

$$ii) \text{Rego } (35 + 498 + 0.02 \times 16980) \times 1.10 = 959.86$$

$$\text{Total} - 959.86 + 474.60 = 1434.46$$

$$\boxed{30} a) i) V = 4000 - 20t \quad \text{or}$$

$$V = 4 - 0.02t$$

$$ii) V = 4000 - 20 \times 2.5$$

$$= 3950 \text{ mL}$$

$$iii) 0 = 4000 - 20t$$

$$20t = 4000$$

$$t = 200 \text{ min}$$

$$b) 300 \times (0.35 + 0.45) = \$240$$

$\therefore$ only pays \$79

$$g) i) r = 0.96$$

strong positive correlation

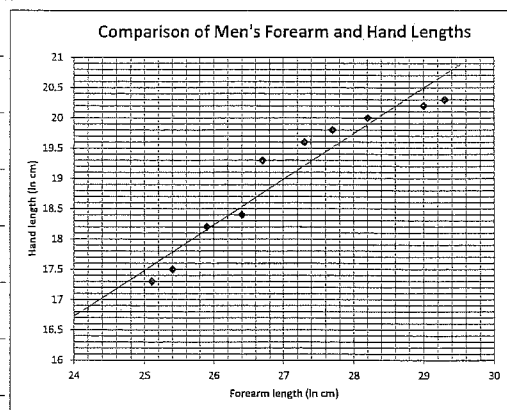
$$ii) \bar{y} = 19.06 \quad \sigma_y \approx 1.06$$

$$iii) \text{gradient} = 0.96 \times \frac{1.06}{1.35} = 0.75$$

$$y\text{-int} = 19.06 - (0.75 \times 27.08) = -1.25$$

$$iv) y = 0.75 \times 24 - 1.25 = 16.75 \text{ cm}$$

v)



vi) No - as this graph is for men
or - it is beyond the bands of the data points on this graph

$$d) \text{Inside} - P = 2 \times \pi \times 1.5 \times \frac{290}{360} = 7.592$$

$$\text{Outside} \quad P = 2 \times \pi \times (1.5 + 1.2) \times \frac{290}{360} = 13.666$$

$$\text{Ends} \quad P = 2 \times 1.2 = 2.4$$

$$\text{Total } P = 7.592 + 13.666 + 2.4 = 23.66 \text{ m}$$