Barker College

2021
YEAR 12 TRIAL HSC EXAMINATION

Mathematics Standard 2

Staff Involved: **FRIDAY 20TH AUGUST**

- **AXD* Mrs Allison Davis**
- **JWH Mr John Hawke**
- **JZT Mrs Jodi Thomas**
- **DXC Mr Daniel Chua**
- **JAI Miss Jess Iles**
- **JML Mrs Jacqui McLachlan**
- **RJW Mr Rhys Williams**

Number of copies: 180

General Instructions

- Time – 2 hours, 40 minutes (10 minutes recommended reading time)**.**
- Write using black pen only.
- NESA approved calculators may be used.
- Reference sheet provided separately and at the end of this paper.

Total marks – 100

Section I **Page 5 – 11**

15 marks

- Attempt Questions 1 – 15
- Allow about 25 minutes for this section

Section II **Pages 12 – 31**

85 marks

- Attempt Questions 16 – 37
- Allow about 2 hours 5 minutes for this section

Online Instructions

Section I

15 marks
Attempt Questions 1 – 15
Allow about 25 minutes for this section
Use Canvas to select your preferred response for Questions 1 – 15.

Section II

85 marks
Attempt Questions 16 - 37
Allow about 2 hours and 5 minutes for this section

Instructions:

- Answer the questions on your own lined paper, clearly indicating which question you are answering.
- For many questions, you will annotate the pages you have printed from the email you have received already. These are noted at the start of the applicable question (e.g. Question 16).
- Spaces provide guidance for the expected length of response.
- Write your student number on all answer pages.
- Section II will be uploaded in 4 sections: Q16-21, Q22-27, Q28-33, Q34-37
- Your responses should include relevant mathematical reasoning and/or calculations.

Section I

15 marks
Attempt Questions 1 – 15
Allow about 25 minutes for this section

Use Canvas to select your preferred response for Questions 1–15.

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1 The number of significant figures in the number 0.005709 is:

(A) 3

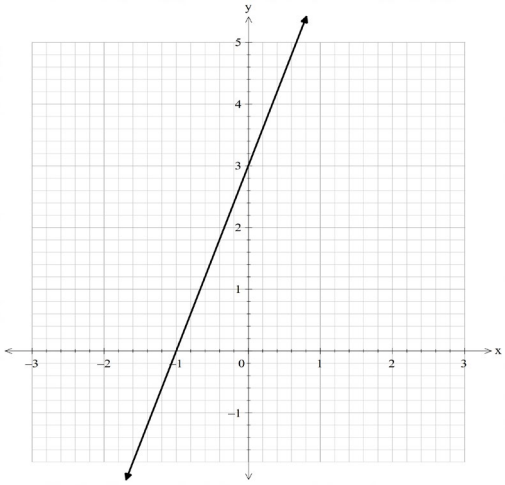
(B) 4

(C) 5

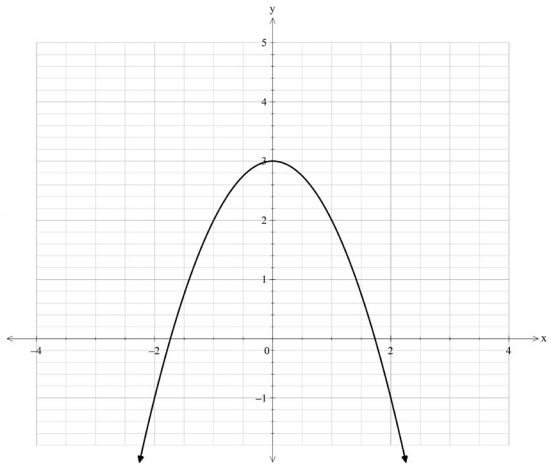
(D) 6

2 Which of the following could represent the graph of $y = 3^{-x}$.

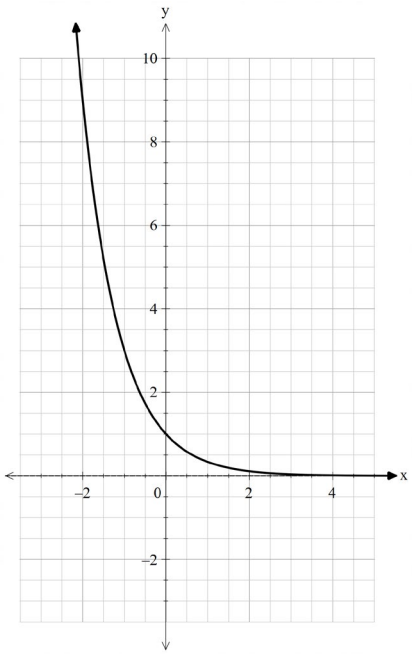
(A)



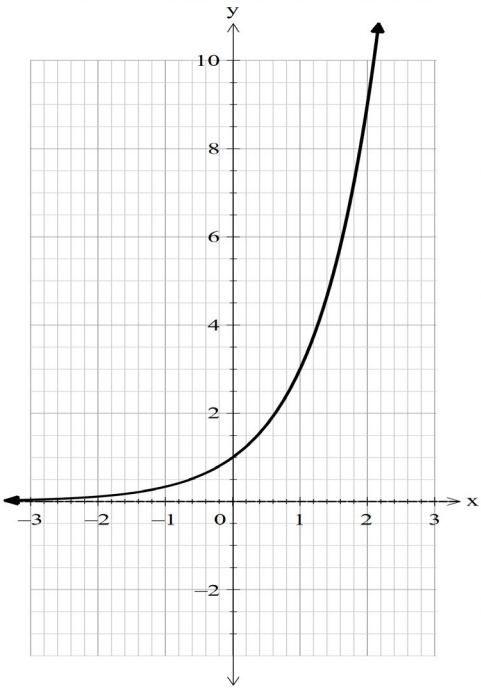
(B)



(C)



(D)



3 A child's shoe is measured to be 24.2 cm, correct to one decimal place.

What is the percentage error in this measurement?

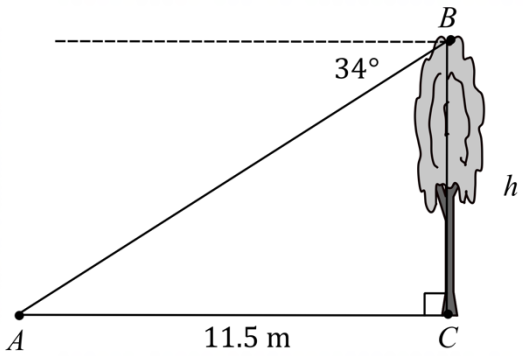
(A) 0.2066%

(B) 0.4132%

(C) 2.066%

(D) 4.132%

4 The angle of depression from the top of a tree (B) is 34° and the horizontal distance on the ground from A to C is 11.5 metres.



Not to scale

Which of these expressions would correctly give the height (h) of the tree above the ground?

(A) $11.5 \times \tan 34°$

(B) $\frac{11.5}{\tan 34°}$

(C) $11.5 \times \tan 56°$

(D) $\frac{11.5}{\sin 34°}$

5 The table below shows age and hand span for a group of students.

Age (years)	12	15	11	19	9	13	12
Hand span (cm)	19.2	18.4	16.5	21.0	14.2	17.1	18.7

The value of Pearson's correlation coefficient (***r***) is:

(A) 6.821

(B) 0.835

(C) 0.879

(D) 1.000

6 Chloe invested \$1000 in an account which pays compound interest monthly. To calculate the amount that her investment would grow to by the end of the investment period, she evaluated the following: $FV = 1000(1.007)^{48}$. The term of the loan and the annual interest rate are:

(A) 4 years, 8.4% p.a.

(B) 12 years, 7% p.a.

(C) 48 years, 0.7% p.a.

(D) 4 years, 7% p.a.

7 The following cumulative frequency table shows the results of a test out of 25.

Score (x)	Frequency (f)	Cumulative Frequency
19	3	3
20	5	8
21	2	10
22	0	10
23	7	17
24	1	18
25	3	21

What is the median?

(A) 21.5

(B) 22

(C) 22.5

(D) 23

8 A study on holiday destinations for NSW high school students is to be conducted. Data is to be gathered using a questionnaire.

The questionnaire begins with the three questions shown.

Q1:	Did you travel for a holiday in 2021? Yes ☐ No ☐
Q2:	How did you travel to that destination? ……
Q3:	Would you visit that destination again? Yes ☐ No ☐

The type of data that will be collected in Q2 of the questionnaire could be classified as:

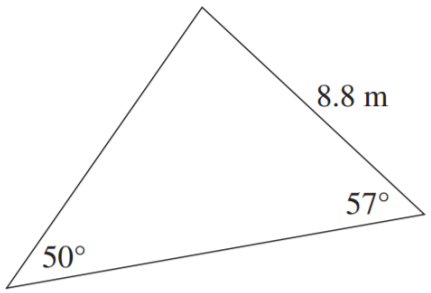
(A) Numerical discrete

(B) Numerical continuous

(C) Categorical ordinal

(D) Categorical nominal

9 What is the length of the LONGEST side (to the nearest metre) in this triangle?



NOT TO SCALE

(A) 9 m

(B) 10 m

(C) 11 m

(D) 12 m

10 There are six students in a year 12 Latin class. On Monday, when Eden was absent from school, the other five students sat a quiz and obtained scores with a mean value of 18. After Eden completed the quiz the class mean score became 16. What was Eden's mark on the quiz?

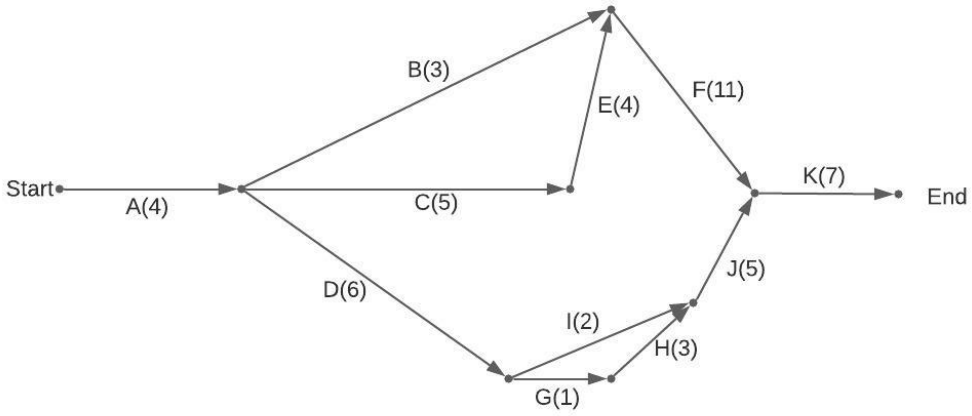
(A) 6

(B) 8

(C) 16

(D) 18

11 A cooking challenge on the show *MasterChef* involves the following steps to be completed in order.



The minimum completion time for the activities is 31 minutes.

The critical path for the project is:

(A) A-B-F-K

(B) A-D-I-J-K

(C) A-C-E-F-K

(D) A-D-G-H-J-K

12 Dion has 3000 shares with a market value of $4.50 per share. The shares paid a dividend yield of 5% per share. What dividend will Dion receive?

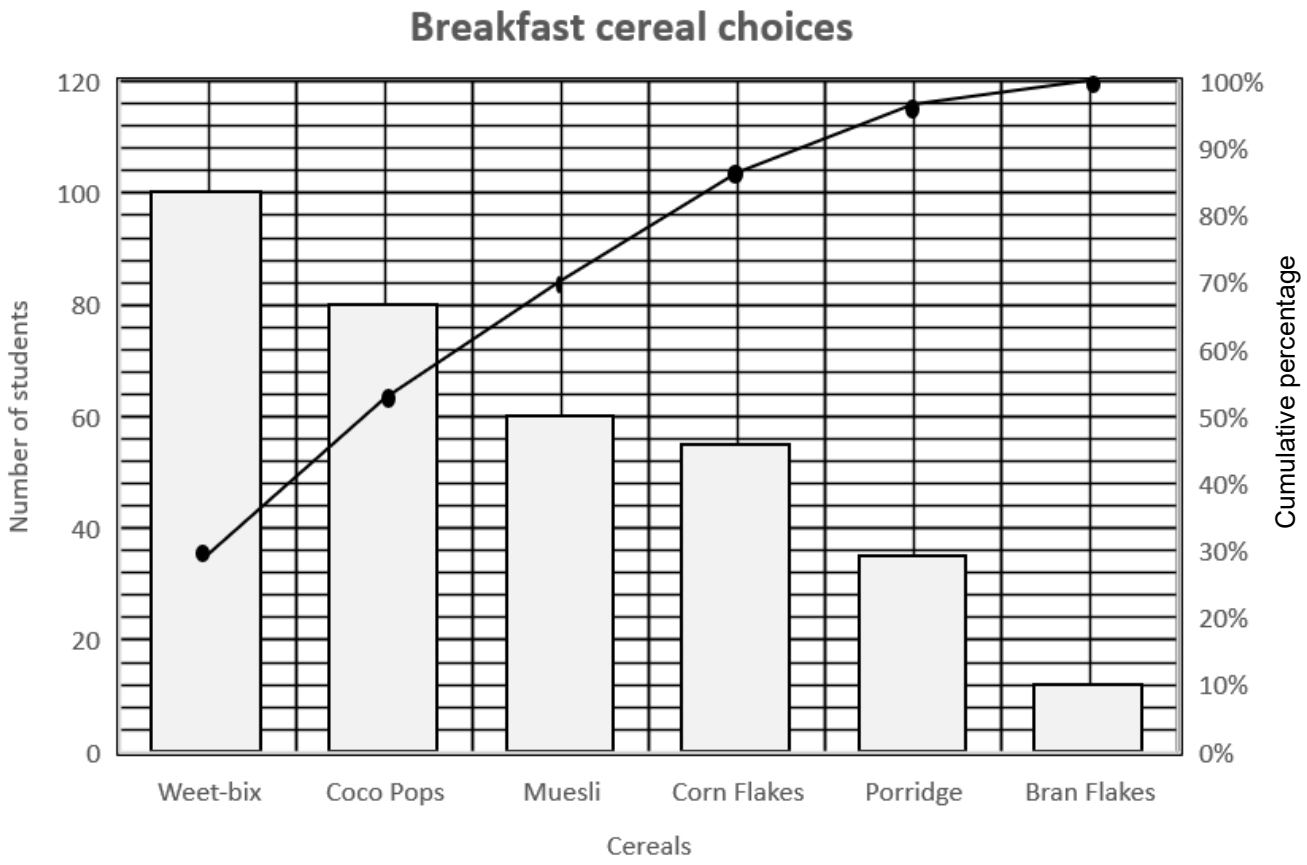
(A) $576

(B) $875

(C) $675

(D) $13 500

13 A school collected data related to the type of breakfast cereal students preferred to eat in the morning. The Pareto chart shows the data collected.



What percentage of students chose Corn Flakes as their breakfast cereal choice?

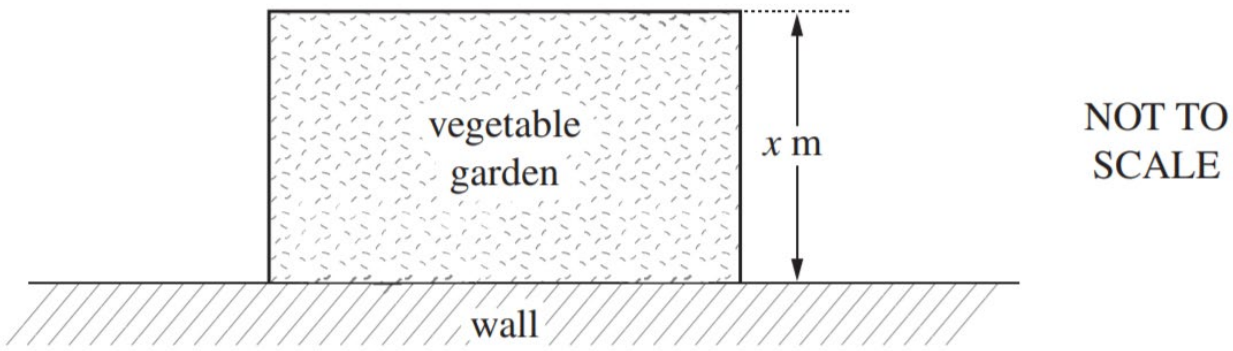
(A) 17%

(B) 48%

(C) 55%

(D) 88%

14 Tayla wants to build a rectangular vegetable garden in her backyard. She has 30 metres of fencing and will use a wall as one side of the garden. The plan for her garden is shown, where x metres is the width of her garden.



Which equation gives the area, A, of the vegetable garden?

(A) $A = 15x - x^2$

(B) $A = 15x - 2x^2$

(C) $A = 30x - x^2$

(D) $A = 30x - 2x^2$

15 A scientist wants to estimate the number of mice in the city. A sample of N mice are captured, tagged and released. A week later a sample of S is captured, and it is noted that M of them had been previously tagged.

Which is the correct expression to estimate the number of mice in the city.

(A) $\frac{MN}{S}$

(B) $\frac{NS}{M}$

(C) $\frac{MS}{N}$

(D) $\frac{N}{MS}$

End of Section I

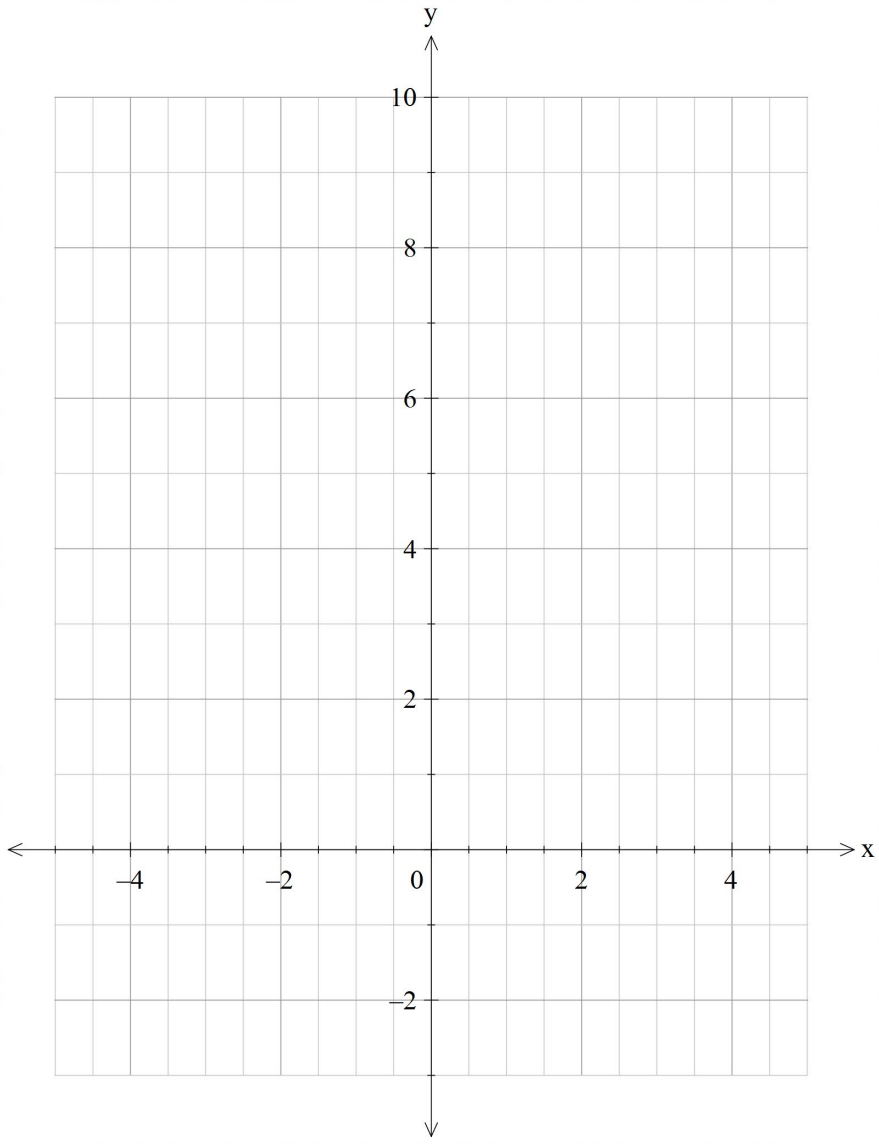
Section II

Question 16 (5 marks) **(Note: this question has been emailed to you already)**

(a) Complete the table of values for the equation $y = 0.5x^2 - x + 2$ **2**

x	-3	-2	-1	0	1	2	3	4
y								

(b) Sketch the graph of $y = 0.5x^2 - x + 2$ **2**



(c) Give the equation of the axis of symmetry. **1**

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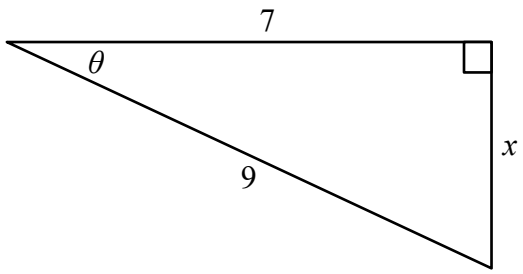
Question 17 (4 marks)

Consider the triangle shown.



(a) Find the value of θ, correct to the nearest minute. **2**

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(b) Find the value of x, correct to one decimal place. **2**

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Question 18 (2 marks)

Use the table below to calculate the present value of an annuity where \$15, 200 is contributed each year for five years into an account earning 2% per annum compound interest. **2**

	Present value of \$1				
End of year	2%	*3%*	*4%*	*5%*	*6%*
4	4.5797	4.4518	4.3295	4.2124	4.0953
5	5.4172	5.2421	5.0757	4.9173	4.7346
6	6.2303	6.0021	5.7864	5.5824	5.3489

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Question 19 (4 marks)

Georgia has a credit card with the following conditions:

- There is no interest-free period.
- Interest is charged at the end of each month at 23.25% per annum, compounding daily, from the purchase date (included) to the last day of the month (included).

Georgia's credit card statement for August is shown, with some figures missing.

Statement period: 1 August to 31 August

Date	**Details**	**Amount ($)**
1 August	Opening balance	200
14 August	Shoes	312
31 August	Interest charged	***
31 August	Closing balance	***

Minimum payment: ☐

The minimum payment is calculated as 1.5% of the closing balance on 31 August.

Calculate the minimum payment. **4**

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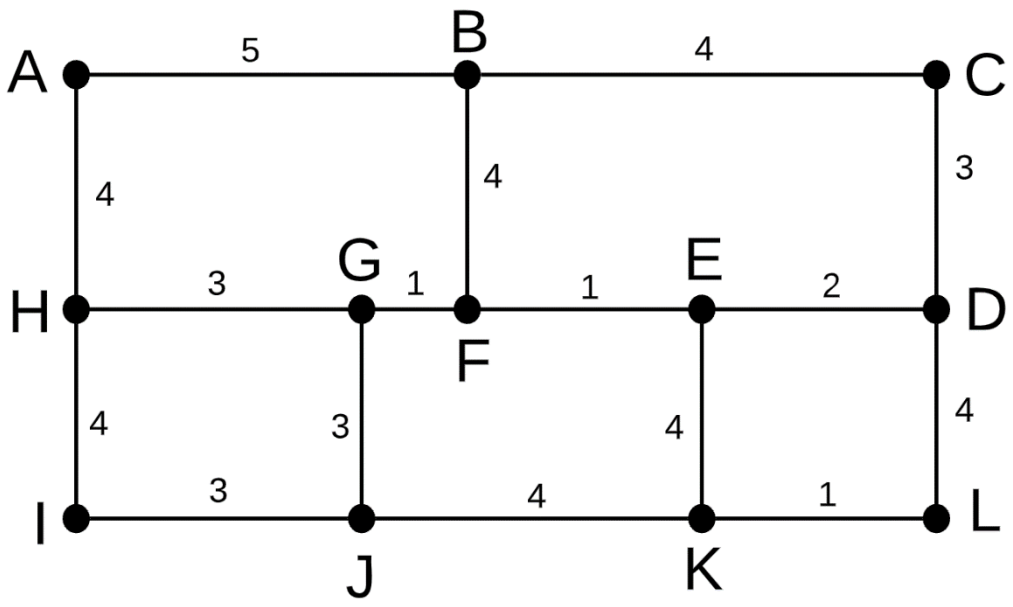
Question 20 (3 marks)

The diagram represents a network with weighted edges.

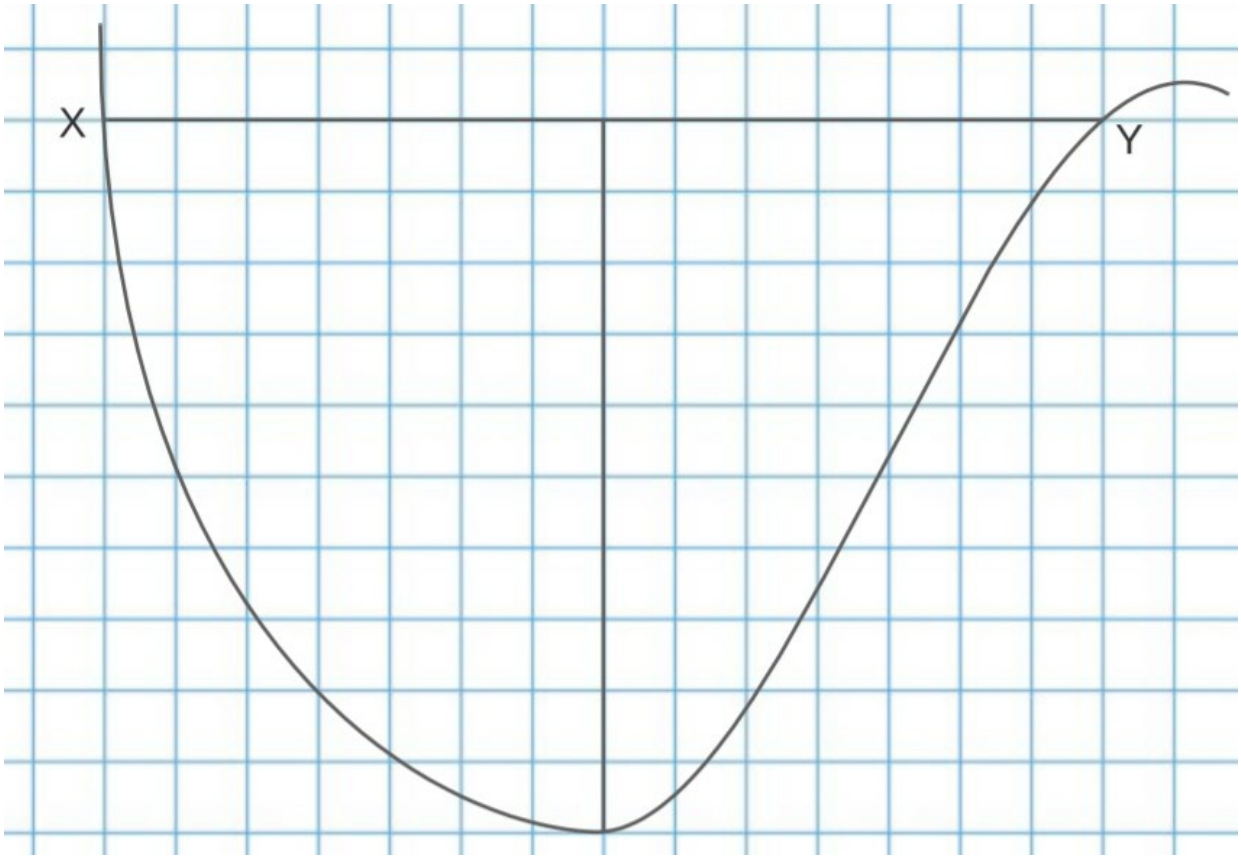


Draw a minimum spanning tree for this network and determine its length. **3**

Minimum length of spanning tree = ……

Question 21 (4 marks)

The diagram shows a cross-section of a plan for the new Quarry Void Lake in Hornsby Park. The plan was drawn on a 1cm grid where 1cm = 2 m.



(a) At the deepest point along the width of the lake *XY*, a depth measurement was taken in metres. Use two applications of the trapezoidal rule to calculate the approximate cross sectional area of the lake. **3**

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(b) How could the accuracy of the area of the cross section be improved? **1**

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START A NEW PAGE SINCE QN 22-27 WILL BE UPLOADED SEPARATELY

Question 22 (3 marks)

Josh is planning a trip with his friends. The cost of hiring a mini-bus is \$1200. The table shows the cost (C) per person for various numbers of people (N).

Number of people	1	2	3	4	5	N
Cost per person	\$1200	\$600	\$400	\$300	\$240	$\boldsymbol{C}$

(a) Find an expression for $\boldsymbol{C}$ in the table. **1**

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(b) How many people are needed so the cost per person is \$50? **1**

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(c) Josh has many friends. Is it possible for the cost per person to be \$10? Give a reason for your answer. **1**

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Question 23 (5 marks)

A group of people were surveyed about getting the COVID-19 vaccine. Their ages are listed below:

18, 21, 24, 71, 65, 54, 32, 19, 25, 32, 95

(a) Calculate the mean of this data set. **1**

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(b) What is the standard deviation of this set of data, correct to one decimal place? **1**

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(c) Is the age of the oldest person surveyed considered an outlier? Justify your answer with calculations. **3**

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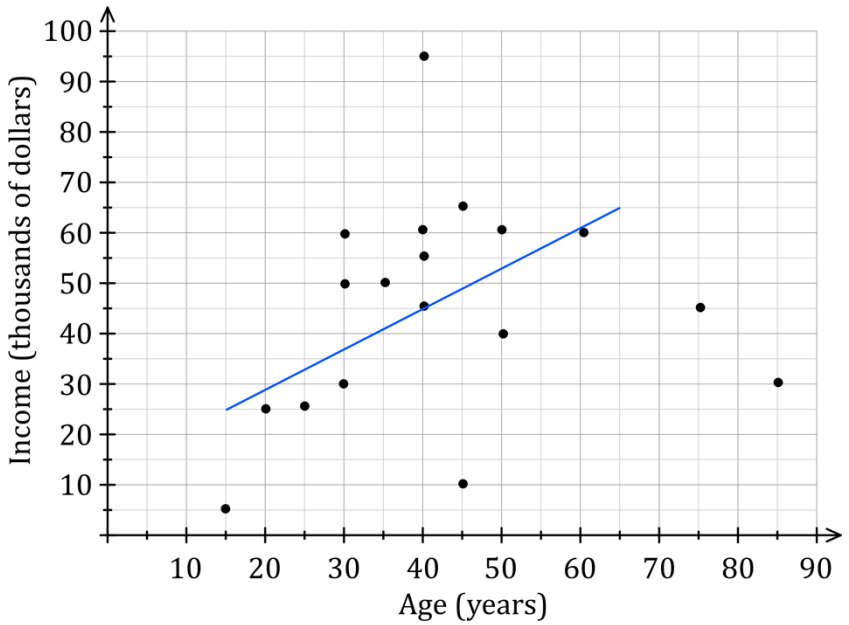
Question 24 (5 marks)

A sample of 18 randomly selected people were asked to state their Age (in years) and their Income (in $1000). The results are displayed in the scatterplot below with a line of best fit drawn.



(a) Calculate the gradient of the line of best fit shown. **1**

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(b) What is the equation of the line of best fit shown. **2**

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(c) Use your equation to calculate the expected income of an 80-year-old person. Do you think that this is a useful value for this 80-year-old? Why? **2**

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Question 25 (5 marks) **(Note: this question has been emailed to you already)**

Alex has an investment, and it is modelled by the recurrence relation:

$$A_n = A_{n-1}(1.07)$$

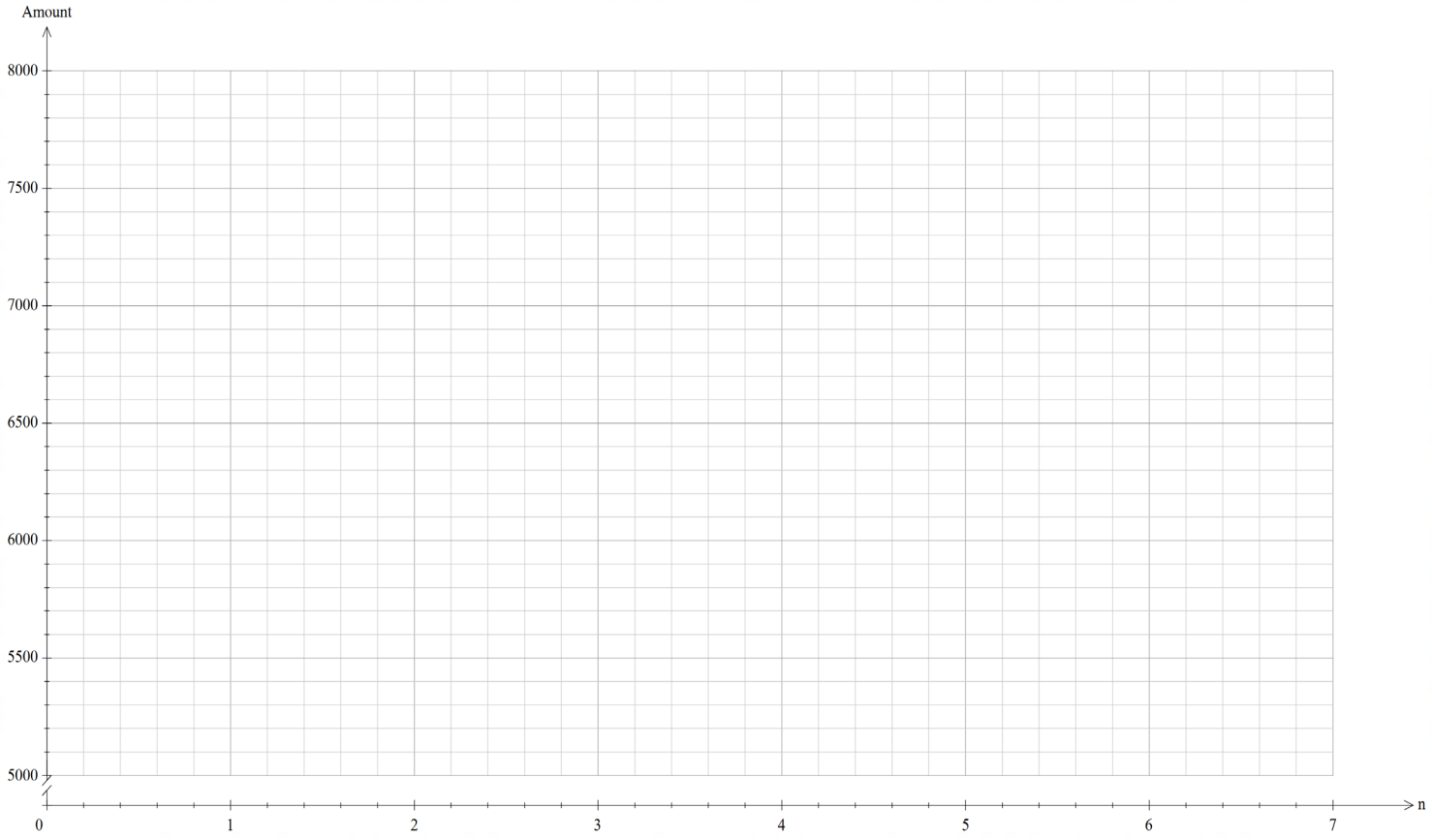
where $n = 1,2,3,$ ... and $A_0 = 5000$.

Alex decides to graph the value of his investment to work out how many years it will take him to reach \$7500.

(a) Complete the table of values for his investment (to the nearest cent). **2**

n	1	2	3	4	5	6
A_n						

(b) Draw the graph of his investment. **Note: this is not a straight line**. **2**



(c) Calculate the amount of interest earned in the first 6 years. **1**

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Question 26 (3 marks)

Solve the equation $\frac{3x}{4} + 1 = \frac{2x-1}{5}$, leaving your answer as a fraction. **3**

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Question 27 (3 marks)

Jarrah is planning a trip from Sydney, Australia (UTC +10) to Miami, Florida (UTC -5).

(a) What is the time difference between these cities? **1**

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(b) Jarrah boards his Qantas flight on 7:00am on the 6th December Sydney time, and the trip lasts 23 hours including stop overs. What is the local time and date in Miami when Jarrah arrives? **2**

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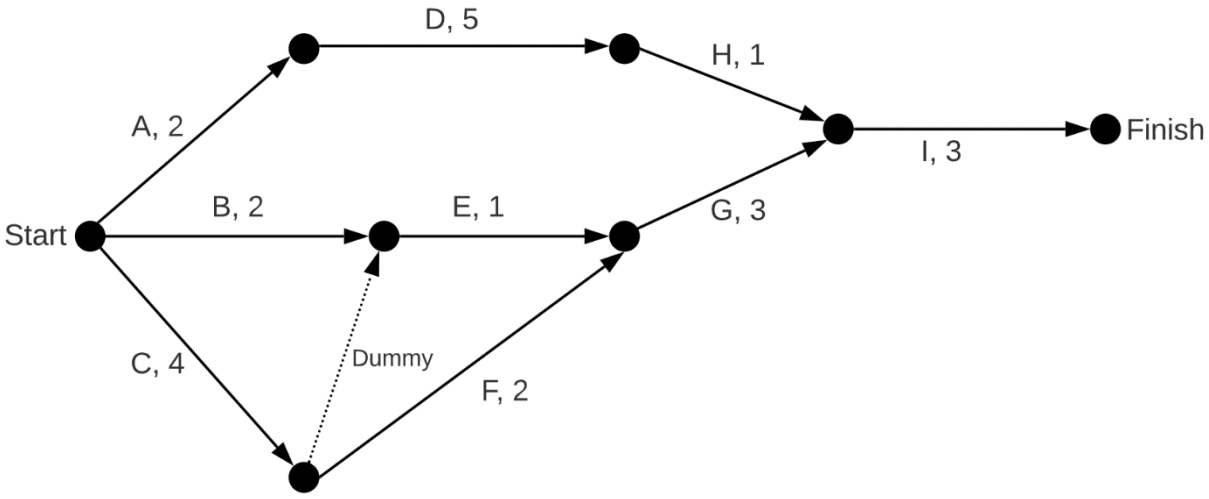
START A NEW PAGE SINCE QN 28-33 WILL BE UPLOADED SEPARATELY

Question 28 (3 marks) **(Note: this question has been emailed to you already, but you will need to add the details to the diagram)**

The network shows the activities needed to complete a project and their duration in hours.



(a) What is the float time for activity E? **1**

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(b) List the activities which make up the critical path for this network. **2**

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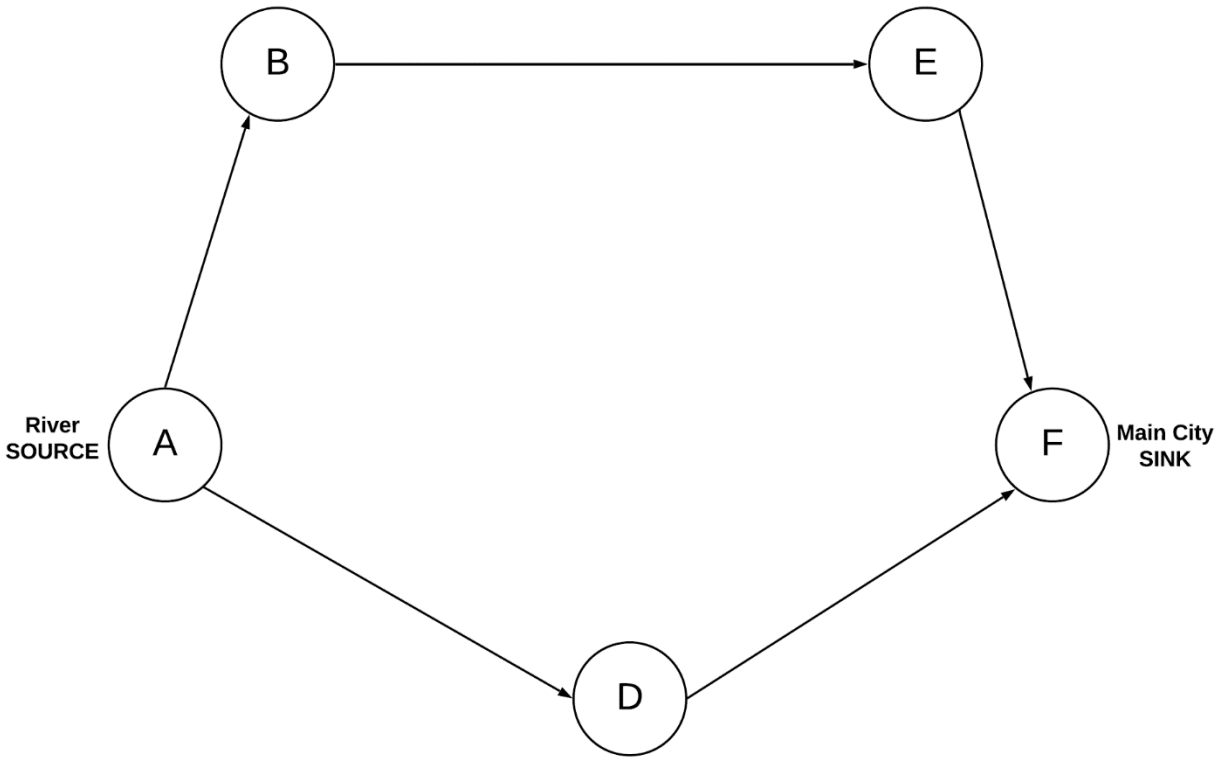
Question 29 (5 marks) **(Note: this question has been emailed to you already)**

The NSW government is planning on building a new network of pipes from a river (A) to several small towns (B-E) and the main city (F). The table below shows the network of pipes joining the towns and city from the river.

From	To	Flow capacity (megalitres)
A (river)	B	1000
A (river)	C	600
A (river)	D	800
B	E	1100
C	E	400
C	F (city)	100
D	F (city)	600
E	F (city)	1600

(a) Using the table, complete the unfinished network diagram below, which has some of the edges and towns missing. Include all necessary labels. **3**



Question 29 continues on the next page

Question 29 (continued)

(b) Determine the maximum flow capacity from the source at the river (A) to the sink at the city (F). Show the cut for this on the diagram. **2**

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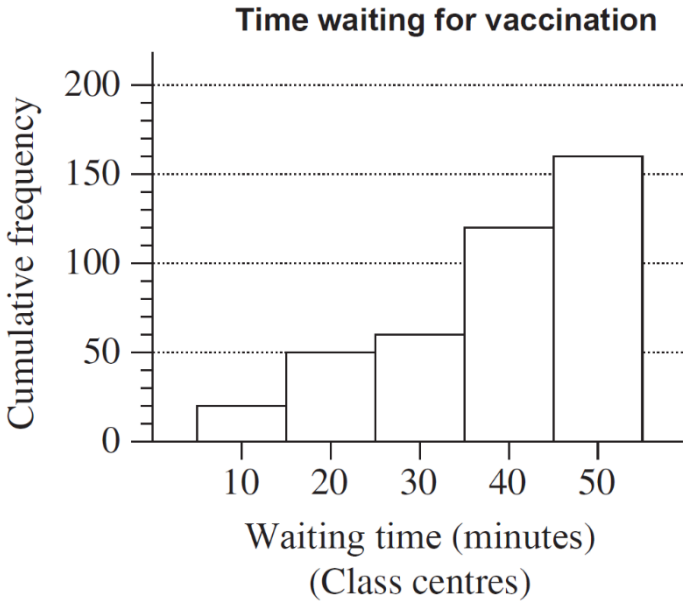
Question 30 (2 marks) **(Note: this question has been emailed to you already)**

The time taken for 160 people to get their COVID-19 vaccination at the NSW Health Vaccination centre were recorded, grouped into classes and then displayed using the cumulative frequency histogram shown.



Use the diagram above to estimate the **median** waiting time for vaccination. **2**

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Question 31 (4 marks)

At the end of a mathematics exam there were 50 phones in a bucket. There were 43 iPhone brand and the rest were Android brand. Sarah selected two phones at random from the bucket.

(a) Draw a probability tree diagram for selecting two phones at random. **2**

(b) What is the probability of selecting two phones of the same brand? **2**

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Question 32 (3 marks)

The table below gives the future value of an annuity with a contribution of $1 per period.

Future value of an annuity with a contribution of $1 at the end of each period									
Period	*Interest rate per period*								
	1%	2%	3%	4%	5%	6%	8%	10%	12%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0800	2.1000	2.1200
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2464	3.3100	3.3744
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.5061	4.6410	4.7793
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.8666	6.1051	6.3528
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.3359	7.7156	8.1152
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.9228	9.4872	10.0890
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.6366	11.4359	12.2997
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	12.4876	13.5795	14.7757

(a) Ned is planning to purchase a car. He needs $50 000 to afford the car. His bank offers an account with interest paid every 6 months at a rate of 16% per annum. Use the table to determine, to the nearest dollar, how much Ned will need to contribute to the account at the end of each 6-month time period in order to reach his goal in 4 years. **2**

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(b) How much interest will Ned have earned over the 4 years if he takes the bank offer? **1**

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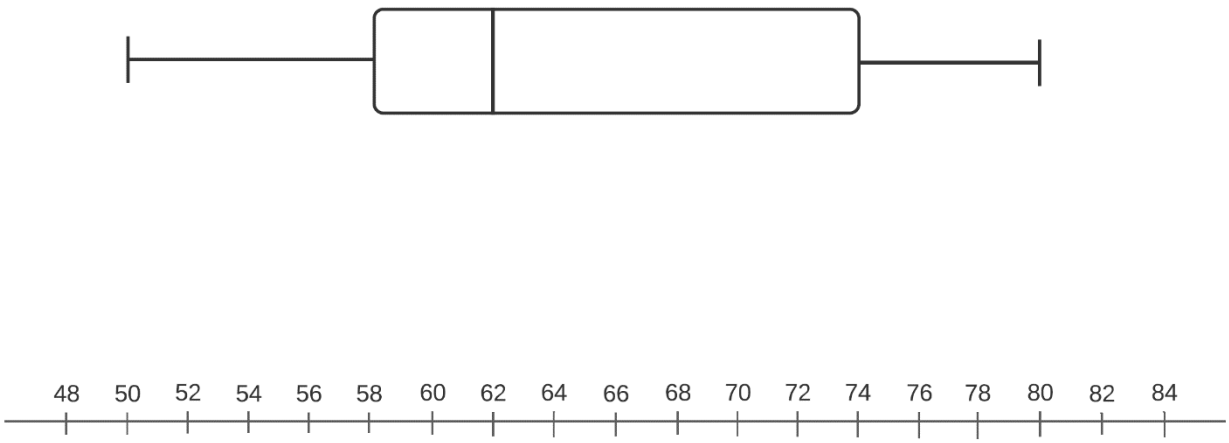
Question 33 (4 marks) **(Note: this question has been emailed to you already)**

Sam and Stuart each sat 15 class tests. Sam's results on the test are displayed in the box-and-whisker plot shown in part (a).

(a) Stuart's 5-number summary for the tests is 50, 56, 66, 76, 82.

Draw a box-and-whisker plot to display Stuart's results below that of Sam's results. **1**



(b) What percentage of Sam's results were below 62? **1**

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(c) Sam claims that his results were better than Stuart's. Is he correct? Justify your answer by referring to the summary statistics and the skewness of the distributions. **2**

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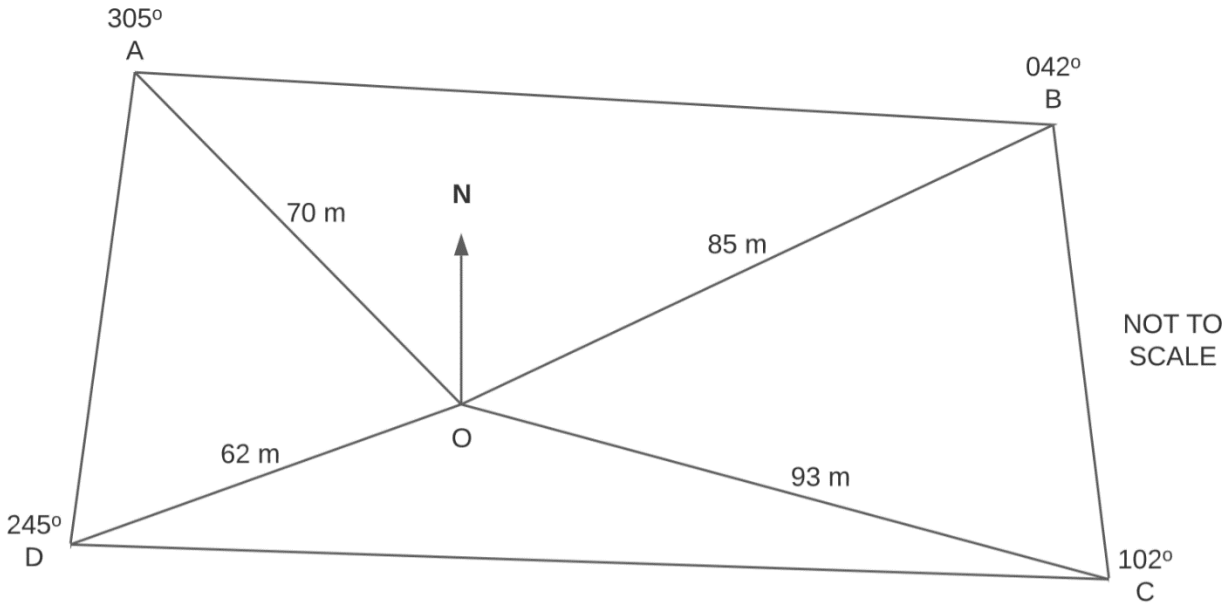
Question 34 (5 marks)

A compass radial survey of the field *ABCD* has been conducted from *O*.



(a) Find the area of the section *ABO*, the nearest square metre. **2**

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(b) If 8mm of rain fell on the field, what volume of rain (in m^3) fell on the section *ABO*? **2**

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(c) Using $1m^3$=1kL calculate the number of litres of water that fell on the section *ABO*. **1**

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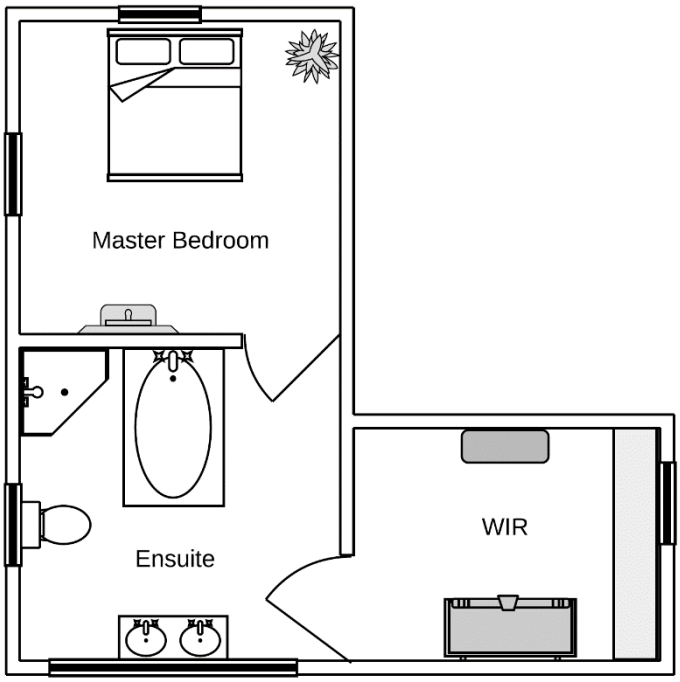
Question 35 (4 marks) **(Note: this question has been emailed to you already)**

A section of a floor plan is shown below. Scale of 1:120



(a) What are the dimensions of the inside walls of the master bedroom? State your response in metres correct to one decimal place. **2**

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(b) A tradeswoman is employed to paint the ceiling of the master bedroom. She paints at a constant rate of $15m^2$ per hour and is paid to the nearest hour, at a rate of \$75 per hour. Find the labour cost to paint the ceiling if two coats of paint are required. **2**

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Question 36 (4 marks) **(Note: this question has been emailed to you already)**

Scarlett is the manager of a farmer's market in which there are 220 stalls for rent. From experience, Scarlett knows that if she charges *d* dollars to rent a stall, then the number of stalls, *s*, that will be rented is given by:

$$s = 220 - 4d$$

(a) How many stalls will be rented if Scarlett charges \$7.50 per stall? **1**

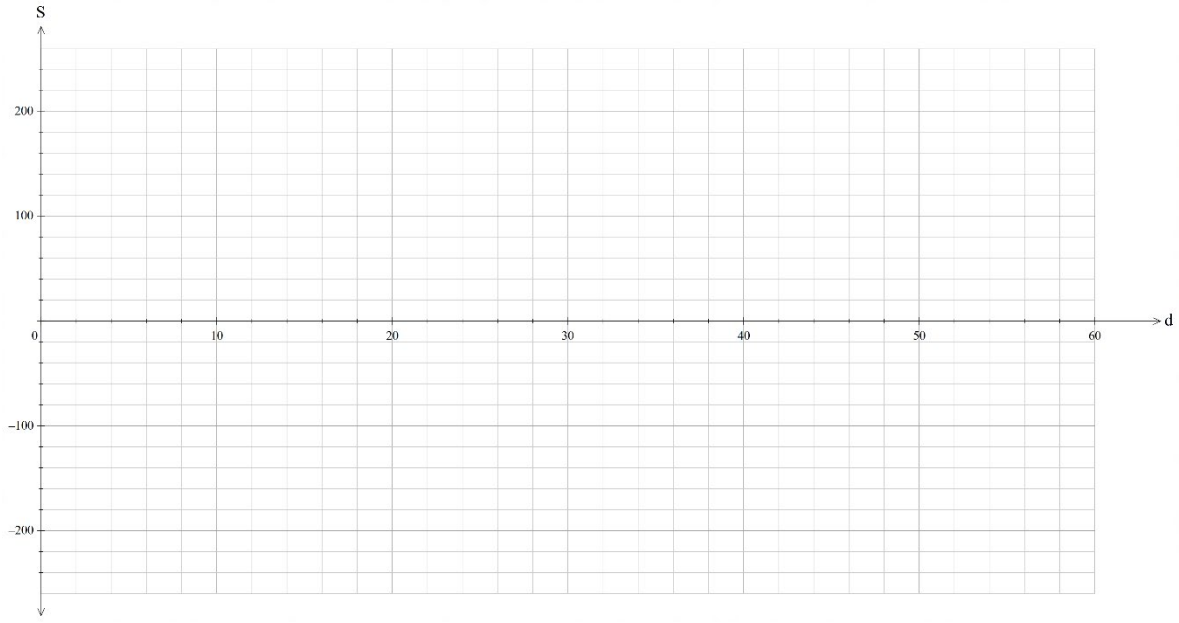
……

……

(b) Complete the following table for the function $s = 220 - 4d$. **1**

d	10	30	50
s			

(c) Draw a graph of the function $s = 220 - 4d$. **1**



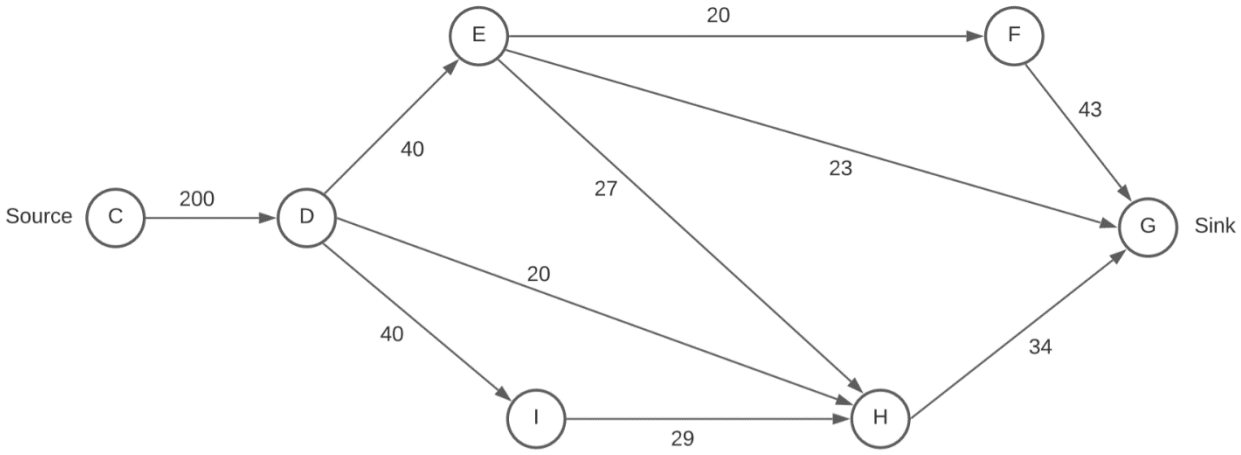
(d) Does it make sense to use the formula $s = 220 - 4d$ to calculate the number of stalls rented if Scarlett charges \$60 per stall? Explain your answer. **1**

……

……

Question 37 (5 marks) **(Note: this question has been emailed to you already, but you will need to add the numbers to the diagram)**

The diagram shows the network of cables that transport high speed internet broadband from a source via nodes to a sink.
Each cables' capacity in Mbps is shown.



Determine the current maximum flow through the network.

The internet company has enough resources to upgrade one of the cables in the network to a higher capacity. Determine the best cable to upgrade and the new maximum flow that it achieves. **5**

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End of Paper

NSW Education Standards Authority

2020 HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics Standard 1
Mathematics Standard 2

REFERENCE SHEET

Measurement

Limits of accuracy

Absolute error = $\frac{1}{2} \times$ precision

Upper bound = measurement + absolute error

Lower bound = measurement – absolute error

Length

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

Area

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

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

$$A \approx \frac{h}{2}(d_f + d_l)$$

Surface area

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

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

Volume

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

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

Trigonometry

$$\sin A = \frac{\text{opp}}{\text{hyp}}, \quad \cos A = \frac{\text{adj}}{\text{hyp}}, \quad \tan A = \frac{\text{opp}}{\text{adj}}$$

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

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

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

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

Financial Mathematics

$$FV = PV(1 + r)^n$$

Straight-line method of depreciation

$$S = V_0 - Dn$$

Declining-balance method of depreciation

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

Statistical Analysis

An outlier is a score

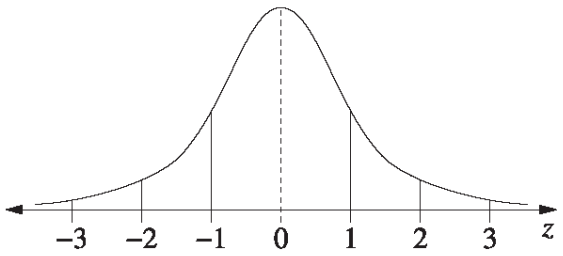
less than $Q_1 - 1.5 \times IQR$

or

more than $Q_3 + 1.5 \times IQR$

$$z = \frac{x - \mu}{\sigma}$$

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

Standard Maths 2021 Trial Student Solutions

Multiple Choice

1. 0.005709 4 sig figs (B)

2. $y = 3^{-x}$ sub $x = -2$

$y = 3^{-(-2)} = 8$

point $(-2, 8)$ (C)

3. $\frac{0.05}{24.2} \times 100 = 0.2066\%$ (A)

4. $\tan 34^\circ = \frac{h}{11.5}$ (A)

$h = \tan 34^\circ \times 11.5$

5. use calculator (B)

6. $4 \times 12 = 48$ so 4 years

$\frac{8.4\%}{12} = 0.7\%$ (A)

7. $\frac{21}{2} = 10.5$ so Median is 11th score. that is 23 (D)

8. An example is "car"

this is categorical, nominal (D)

9. $\frac{x}{\sin 73^\circ} = \frac{8.8}{\sin 50^\circ}$

$x = \frac{8.8 \times \sin 73^\circ}{\sin 50^\circ}$ (C)

$= 10.985$

$\doteq 11m$

10. $\frac{x}{5} = 18$

$x = 5 \times 18$

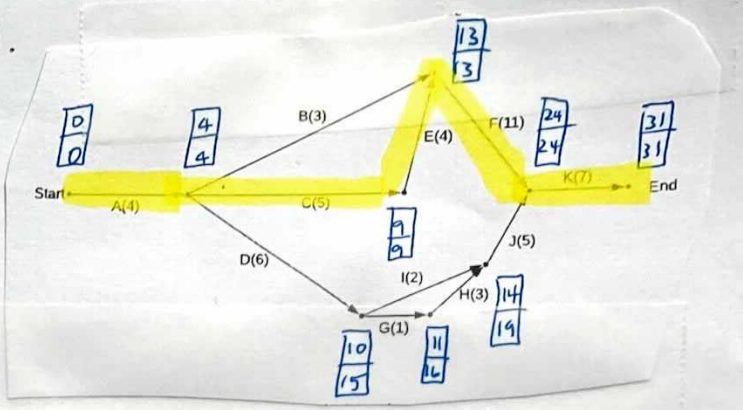
$x = 90$ (A)

$\frac{y}{6} = 16$

$y = 16 \times 6 = 96$

$96 - 90 = 6$ (1)

11.



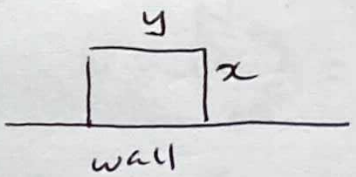
(C)

12. $3000 \times 4.5 \times 0.05 = \$675$ (C)

13. Gap between Corn Flakes and Porridge cumulative percentage approx 17% (A)

14. $30 = 2x + y$

$y = 30 - 2x$



$A = xy$

$A = x(30 - 2x)$

$A = 30x - 2x^2$ (D)

15. T = total mice pop.

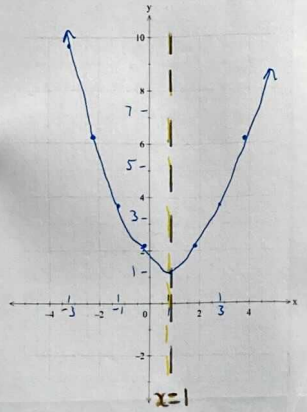
$\frac{N}{T} = \frac{M}{S}$ $\therefore T = \frac{SN}{M}$ (B)

Question 16 (5 marks)

(a) Complete the table of values for the equation $y = 0.5x^2 - x + 2$ 2

x	−3	−2	−1	0	1	2	3	4
y	9.5	6	3.5	2	1.5	2	3.5	6

(b) Sketch the graph of $y = 0.5x^2 - x + 2$ below 2



(c) Give the equation of the axis of symmetry

$x = 1$

17. a) $\cos\theta = \frac{7}{9}$

$\theta = \cos^{-1}\left(\frac{7}{9}\right) = 38°56'32.79''$

$= 38°57'$

b) $x^2 + 7^2 = 9^2$

$x^2 = 81 - 49$

$x = \sqrt{32}$

$= 5.6568$

$= 5.7$ (1 d.p.)

Question 18 (2 marks)

Use the table below to calculate the present value of an annuity where $15, 200 is contributed each year for five years into an account earning 2% per annum compound interest. 2

	Present value of $1				
End of year	2%	3%	4%	5%	6%
4	4.5797	4.4518	4.3295	4.2124	4.0953
5	5.4172	5.2421	5.0757	4.9173	4.7346
6	6.2303	6.0021	5.7864	5.5824	5.3489

$PV = 15200 \times 5.4172$

$= 82341.44$

19.

Minimum payment: 7.79

The minimum payment is calculated as 1.5% of the closing balance on 31 August.

Calculate the minimum payment. 4

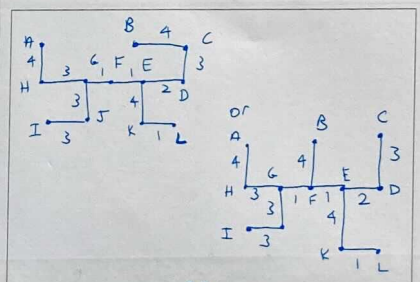
$A_1 = 200\left(1 + \frac{0.2325}{365}\right)^{31} = 203.987$

$A_2 = 312\left(1 + \frac{0.2325}{365}\right)^{18} = 315.59675$

Interest $= 203.99 + 315.60 = \$519.59$

Min payment $= \frac{1.5}{100} \times 519.59 = \$7.79$

20. Draw a minimum spanning tree for this network in the space below and determine its length.



Minimum length of spanning tree = 29

(2)

21a) $A \doteq \frac{14}{2}(0+20) + \frac{14}{2}(20+0)$

$\doteq 280 m^2$

b) by taking more measurements and applying more applications of the Trapezoidal rule.

22a) $C = \frac{1200}{N}$

b) $50 = \frac{1200}{N}$

$N = \frac{1200}{50} = 24$

c) $10 = \frac{1200}{N}$

$N = \frac{1200}{10} = 120$

A mini-bus cannot accomodate 120 ppl, so it is not possible.

23. a) $\bar{x} = 41.45$

b) $\sigma_x = 24.6$

c) $Q_3 = 65 \quad Q_1 = 21$

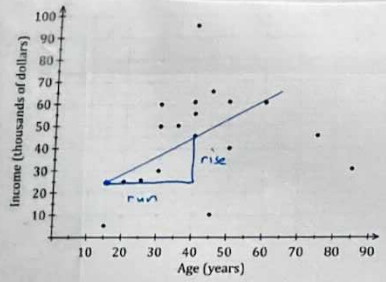
$IQR = 44$

$Q_3 + 1.5 \times IQR = 65 + 1.5 \times 44$

$= 131$

So 95 is <u>not</u> an outlier

24.



(a) Calculate the gradient of the line of best fit shown. 1

(15, 25) (40, 45) $m = \frac{45-25}{40-15} = \frac{20}{25} = \frac{4}{5} = 0.8$

(b) What is the equation of the line of best fit shown. 2

$y = mx + c$ use (15, 25)

$25 = 0.8(15) + c$

$25 - 12 = c$

$c = 13$

$y = 0.8x + 13$

$I = 0.8A + 13$

(c) Use your equation to calculate the expected income of an 80-year-old person. Do you think that this is a useful value for this 80-year-old? Why? 2

$I = 0.8(80) + 13$

$= 77\,000$

this value may not be accurate as an 80 yr old may be retired and have a reduced income.

Question 25 (5 marks)

Alex has an investment, and it is modelled by the recurrence relation

$$A_n = A_{n-1}(1.07)$$

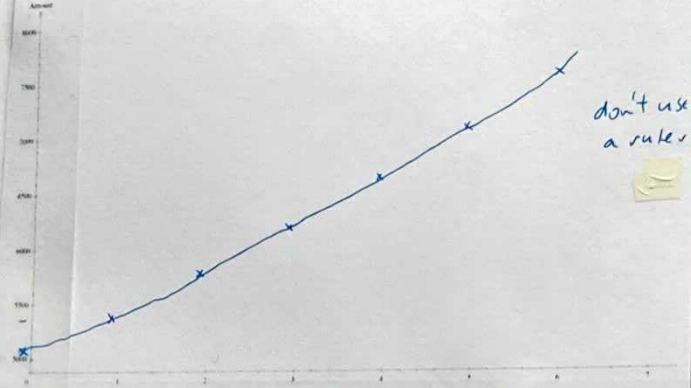
where $n = 1, 2, 3, \ldots$ and $A_0 = 5000$

Alex decides to graph the value of his investment to work out how many years it will take him to reach \$7500.

(a) Complete the table of values for his investment (to the nearest cent). 2

n	1	2	3	4	5	6
A_n	5350	5724.50	6125.22	6553.98	7012.76	7503.65

(b) Draw the graph of his investment below. **Note: this is not a straight line** 2



don't use a ruler

(c) Calculate the amount of interest earned in the first 6 years. 1

7503.65 − 5000 = \$2503.65

26. $\frac{3x+1}{4} = \frac{2x-1}{5}$

$3x + 4 = \frac{4(2x-1)}{5}$

$5(3x+4) = 4(2x-1)$

$15x + 20 = 8x - 4$

$7x = -24$

$x = -\frac{24}{7}$

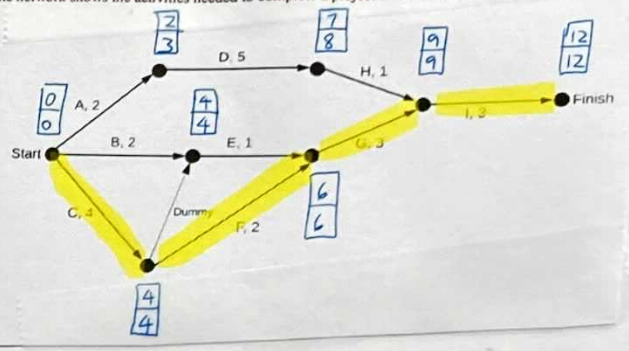
27a) 10 + 5 = 15 hours

b) Miami is 15 hours behind so only add (23 − 15) = 8 hrs

7am + 8 = 3pm 6th Dec

Question 28 (3 marks)

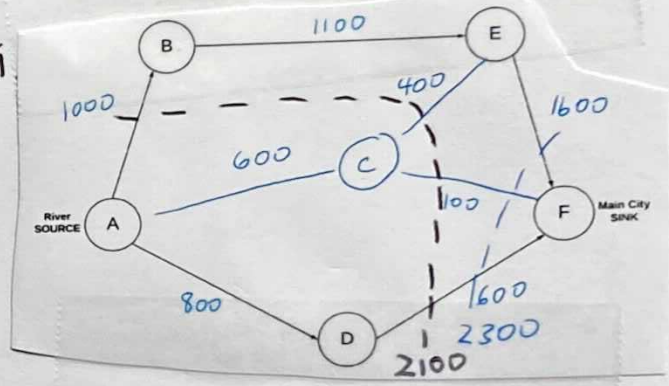
The network shows the activities needed to complete a project and their duration in hours.



a) 1 hour

b) C, F, G, I

29

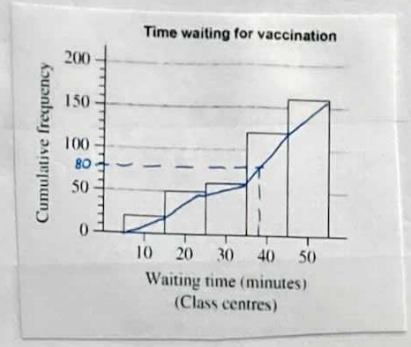


b) max flow = min cut

= 1000 + 400 + 100 + 600

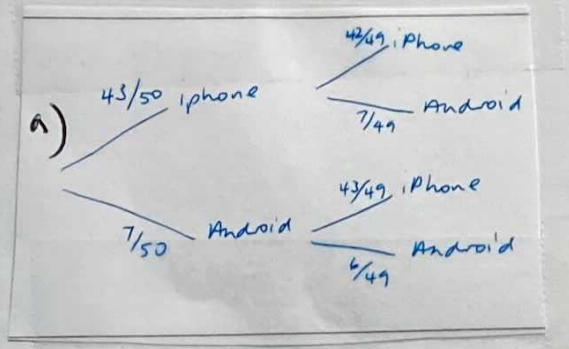
= 2100 ML

30.



Median ≈ 38

31.



b) $P(II) = \frac{43}{50} \times \frac{42}{49} = \frac{129}{175}$

$P(AA) = \frac{7}{50} \times \frac{6}{49} = \frac{3}{175}$

total $= \frac{132}{175}$

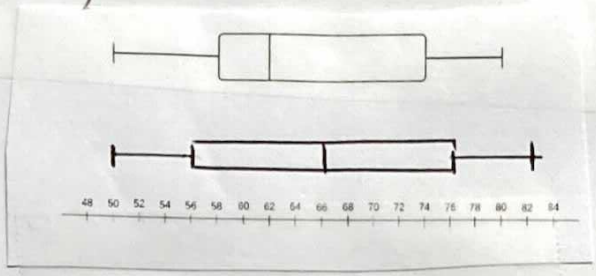
32 a) $50\,000 \div 10.6366$

$= \$4700.75$

b) $4700.75 \times 4 \times 2 = 37606$

$50000 - 37606 = \$12394$

33 a)



b) 50%

(c) Sam claims that his results were better than Stuart's. Is he correct? Justify your answer by referring to the summary statistics and the skewness of the distributions. 2

	Range	Median	IQR	skewness	
Sam	30	62	16	Positive skew	Sam is not correct this boxplot is positively
Stuart	32	66	20	Symmetrical	skewed, 50% of his results are above 62, whereas Stuart has 50% of results above 66. The upper quartile for Stuart is 2 marks higher than that of Sam, as is the highest score, so Stuart performed better in the top 25% of scores. Sam's range and IQR are smaller than Stuart meaning that his scores are more consistent but not better. Both have the same lowest score.

34 a) $\angle AOB = (360 - 305) + 42$

$= 97°$

$A = \frac{1}{2} \times 70 \times 85 \times \sin 97°$

$= 2952.82 = 2953 m^2$

b) $8mm = 0.8cm = 0.008m$

$V = 2953 \times 0.008$

$= 23.624 m^3$

c) Water $= 23.624 kL$

$= 23624 L$

34 a) $4.4 \times 120 = 528cm \div 100 = 5.3m$

$4.5 \times 120 = 540cm \div 100 = 5.4m$

b) $A = 5.3 \times 5.4 = 28.62 m^2$

two coats $= 28.62 \times 2 = 57.24 m^2$

hours $= 57.24 \div 15 = 3.816$

$= 4$ hours

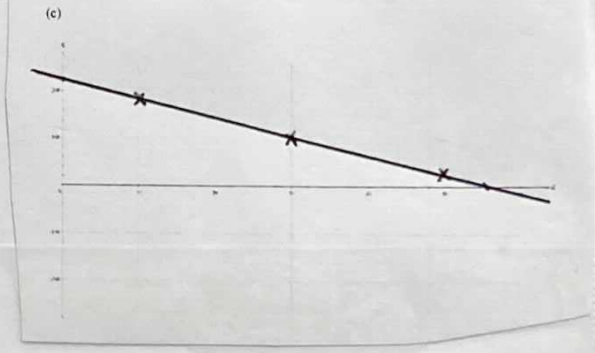
cost $= 75 \times 4 = \$300$

36a) $S = 220 - 4(7.50)$

$S = \$190$

b)

d	10	30	50
s	180	100	20

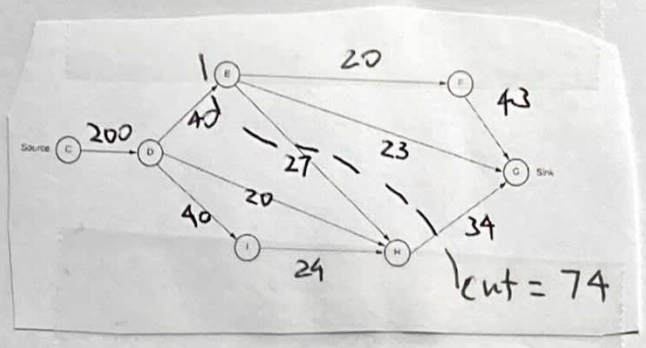


d) $S = 220 - 4(60)$

$S = -20$

No, she cannot have negative stalls

37.



Min cut = max flow
= 74 Mbps

Best cable to upgrade is HG

Before upgrade Inflow to H is 76 Mbps
outflow is 34 Mbps
By upgrading HG to 76 then inflow = outflow
New max flow is now 89 Mbps