



Hunters Hill
High School

Student Number

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2020 TRIAL EXAMINATION

Mathematics Standard 2

**General
Instructions**

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided at the back of this paper
- For questions in Section II, show relevant mathematical reasoning and/or calculations

**Total Marks:
100**

Section I – 15 marks (pages 2–8)

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

Section II – 85 marks (pages 9–32)

- Attempt Questions 16–41
- Allow about 2 hours and 5 minutes for this section

Section I

15 marks

Attempt Questions 1–15

Allow about 25 minutes for this section

Use the multiple-choice answer sheet for Questions 1–15.

- 1** A set data has the following scores:

13, 15, 15, 15, 21, 23, 25, 30, 30, 33

What is the mode?

- A** 22
- B** 30
- C** 10
- D** 15

- 2** Which of the following expresses the ratio 8:20 in simplest form?

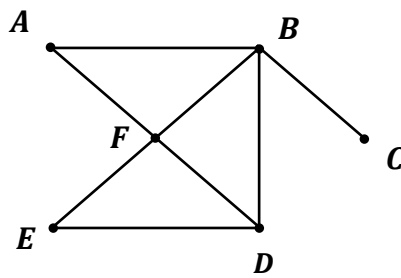
- A** 4:10
- B** 2:4
- C** 2:5
- D** 1:2

- 3** Gina invests \$8000 for 1 year and 3 months at a rate of 6% per annum simple interest.

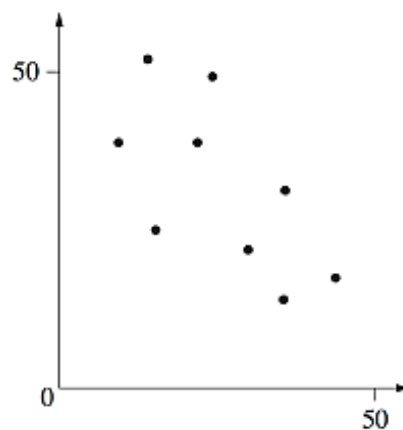
What is the total value of the investment at the end of this period?

- A** \$6000
- B** \$6240
- C** \$8600
- D** \$8624

- 4 What is the degree of vertex B in this network diagram?



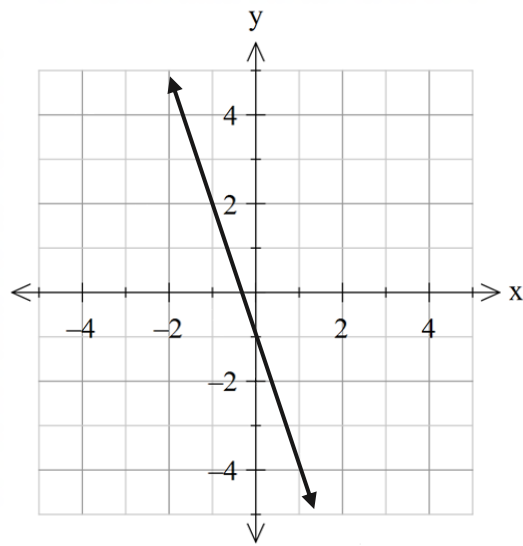
- A 4
B 3
C 2
D 1
- 5 The graph shows a scatter plot for a set of data.



Which of the following values is the most appropriate Pearson's correlation coefficient of this set of data?

- A -1
B 0.35
C -0.35
D -0.63

- 6 What is the equation of the line shown in the diagram?



- A $y = -3x - 1$
- B $y = 3x - 1$
- C $y = 3x + 1$
- D $y = -3x + 1$
- 7 The cost of a calculator, including 10% GST, is \$24.20. Calculate the GST.
- A \$2.42
- B \$2.20
- C \$22
- D \$21.78

- 8** Which of the following correctly expresses y as the subject of the formula $5x - 2y + 4 = 0$?

A $y = \frac{5}{2}x + 2$

B $y = \frac{5}{2}x - 2$

C $y = \frac{5x - 2}{2}$

D $y = \frac{5x + 2}{2}$

- 9** Pat lives in Sydney (UTC +10) and Freya lives in Seattle (UTC -8).

Determine the time and day in Sydney if it is 10:00 pm on Thursday at Seattle.

A 8:00 am Thursday

B 2:00 pm Thursday

C 4:00 pm Friday

D 6:00 am Friday

- 10** Bilal drives a car with a petrol consumption of 22 litres of fuel per 100 kilometres. The gas tank of the car has a capacity of 40 litres.

If Bilal is driving a distance of 870 kilometres, how many full tanks of petrol will he need to reach his destination?

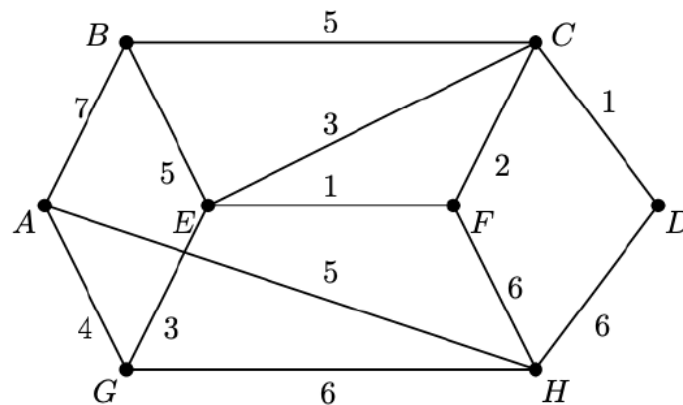
A 4

B 5

C 6

D 7

- 11 This network diagram shows weighted edges (in metres) connecting various vertices.



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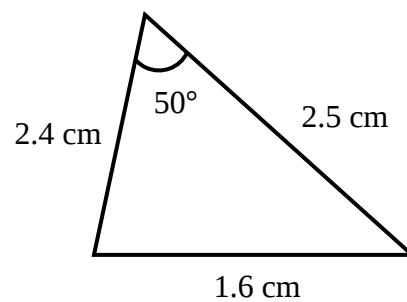
What is the shortest distance from A to D ?

- A 11 m
 - B 13 m
 - C 15 m
 - D 16 m
- 12 Which of the following is not covered by comprehensive car insurance in an accident?
- A Injury to the other driver.
 - B Damage to the other driver's car.
 - C Repairs to own car.
 - D Cost of repairing a damaged building or property caused by an accident with own car.

- 13 The height of a door is measured to be 2.1 metres, correct to the nearest 10 centimetre. What is the absolute error of this measurement?

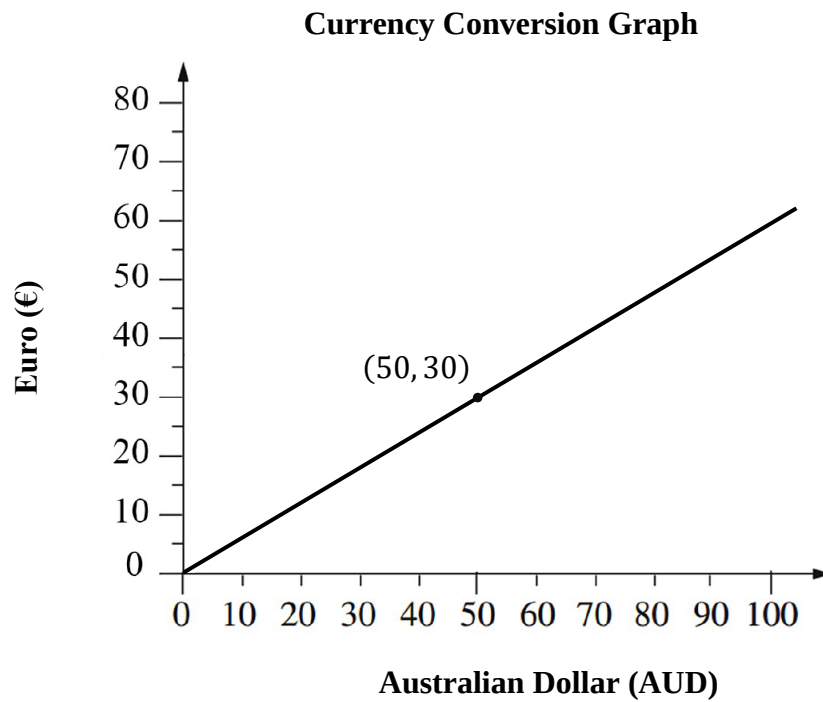
- A ± 0.01 m
- B ± 0.1 m
- C ± 0.5 m
- D ± 0.05 m

- 14 Which of the following would give the correct value for the area of the triangle?



- A $\frac{1}{2} \times 1.6 \times 2.4 \times \sin 50^\circ$
- B $\frac{1}{2} \times 2.4 \times 2.5 \times \sin 50^\circ$
- C $\frac{1}{2} \times 1.6 \times 2.4 \times 50^\circ$
- D $\frac{1}{2} \times 2.4 \times 2.5 \times 50^\circ$

- 15 The graph below is used to illustrate the value of currency between the Euro and the Australian Dollar.



Use the graph to convert 340 Australian Dollars to Euros?

- A € 567
- B € 57
- C € 21
- D € 204

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Mathematics Standard 2

Section II Answer Booklet

85 marks

Attempt Questions 16–41

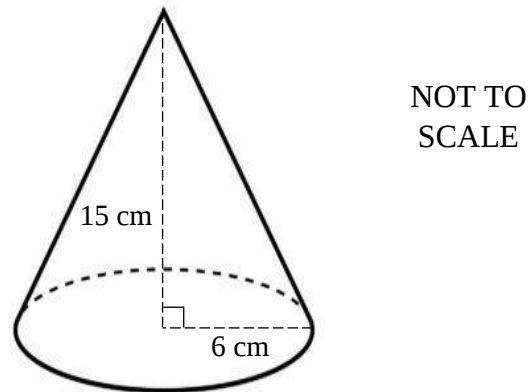
Allow about 2 hours and 5 minutes for this section

Instructions

- Write your Student Number at the top of this page.
 - Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
 - Your responses should include relevant mathematical reasoning and/or calculations.
 - Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.
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Question 16 (2 marks)

A candle is in the shape of a cone with a radius of 6 cm and a perpendicular height of 15 cm. 2



What is the volume of the candle, correct to the nearest cubic centimetre?

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Question 17 (3 marks)

Solve the following equation 3

$$\frac{4 + 7x}{8} - 1 = 3$$

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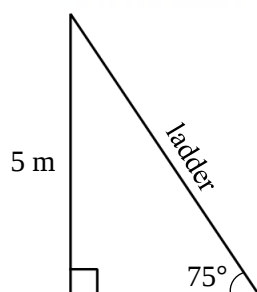
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Question 18 (2 marks)

A ladder needs to be placed on the ground at an angle of 75° . The ladder needs to reach a height of 5 metres.

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How long should the ladder be? Answer in metres, correct to two decimal places.

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Question 19 (2 marks)

A van is purchased for \$48 500.

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This value of the van is depreciated by 9.8% each year, following the declining balance method.

What is the salvage value of the van after 4 years, to the nearest dollar?

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Question 20 (4 marks)

Mary recorded the time (in seconds) it takes her to run 100 metres on ten separate occasions. Her times are shown below.

10.1, 11.2, 12.0, 12.8, 13.5, 14.5, 14.5, 15, 15.1, 23

- (a) Find the first quartile (Q_1) and the third quartile (Q_3) of the data values 2

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- (b) Is Mary's time of 23 seconds considered an outlier? Justify your answer with calculations. 2

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Question 21 (2 marks)

A 3400-watt air conditioner is used to cool a room. The air conditioner is used for a duration of 105 minutes. 2

If electricity costs 35.82 cents per kilowatt-hour, calculate the cost of electricity to cool the room in this time. Correct your answer to the nearest cent.

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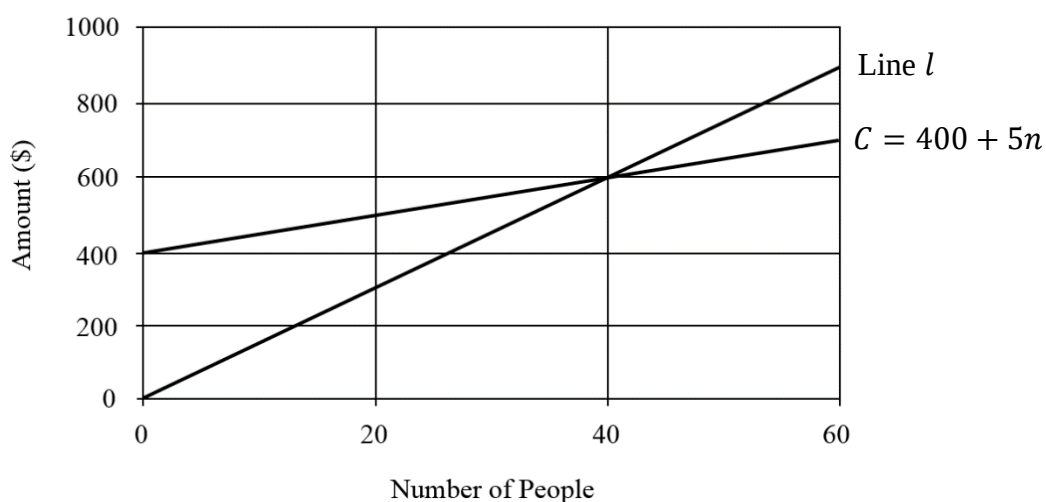
Question 22 (3 marks)

A venue can host a musical event for 150 people.

The cost for the venue to host an event will initially cost \$400 and a further \$5 for each person attending.

This cost (C), in dollars, can be represented by the equation $C = 400 + 5n$ where n is the number of people.

The venue charges \$15 per person. The graph below is a model used to help the venue make financial decisions for hosting an event.



- (a) What does Line l on the graph represent? 1

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- (b) Explain the significance of the point where the two lines intersect. 1

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- (c) Using the graph, or otherwise, find the loss if only 20 people attend. 1

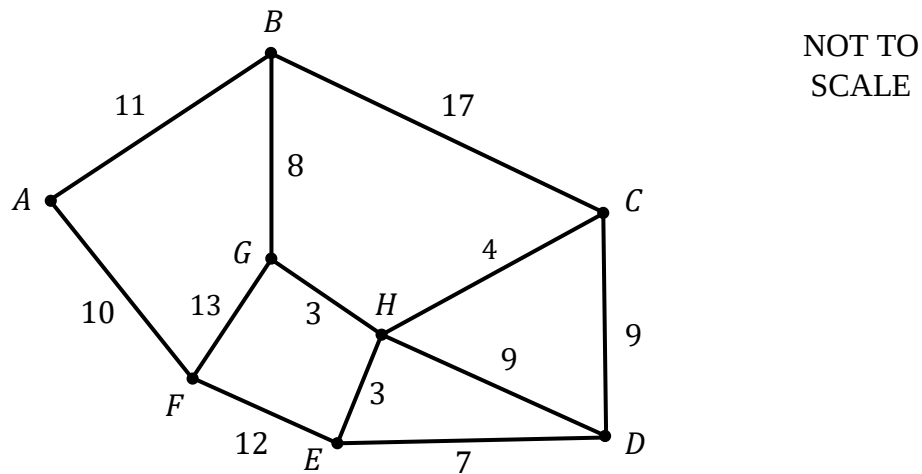
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Question 23 (4 marks)

The network diagram shows the cost, in thousands of dollars, to connect internet cables between various access points.



- (a) Draw the minimum spanning tree in the space provided.

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- (b) Use the minimum spanning tree to determine the minimum amount that must be spent to connect all access points.

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Question 24 (3 marks)

A person purchases 800 shares with a market value of \$3.25 per share.
There is a brokerage fee of 2% of the total purchase price.

- (a)** Calculate the brokerage fee to be paid for purchasing the shares. **1**

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- (b)** The shares are sold for a value of \$4 per share. Calculate the profit made, if there are no further brokerage fees. **1**

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- (c)** Calculate the percentage dividend yield for selling the shares at \$4 per share. **1**

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Question 25 (4 marks)

Simon borrowed \$350000 to buy an apartment. The repayments were set by the bank at \$6000 per quarter, for 20 years.

- (a) What is the total amount that is to be paid for this loan over the 20 years? 1

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- (b) Hence, or otherwise, calculate the interest Simon pays over the 20 years. 1

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- (c) The interest rate of the loan is 4% per annum, compounded quarterly. The loan balance table below shows the interest charged and the balance owing for the first two quarters. 2

Quarter	Principal	Quarterly Interest	Quarterly Repayment	Balance at End of Quarter
1	\$350000	\$3500	\$6000	\$347500
2	\$347500	<i>A</i>	\$6000	<i>B</i>

Find the values of *A* and *B*.

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Question 26 (4 marks)

The formula below is used to calculate an estimate for blood alcohol content (*BAC*) for males.

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

The number of hours required for a person to reach zero *BAC* after they stop consuming alcohol is given by the following formula.

$$\text{Time} = \frac{BAC}{0.015}$$

Jordan weighs 80 kg and he is drinking low alcohol beer. It is indicated on the label of each low alcohol beer that it is 0.7 of a standard drink.

- (a)** Jordan consumed 5 bottles of low alcohol beer over a period of 3 hours. He then stopped drinking alcohol. Show that his *BAC* at the end of this period is approximately 0.02. 2

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- (b)** If Jordan's *BAC* is 0.02, calculate the time will take for his *BAC* to reach zero. Express your answer in hours and minutes. 2

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Question 27 (3 marks)

Lisa is completing her tax return.

She has a gross income of \$92500. In addition, income also comes from an investment totalling \$3000.

Lisa is required to purchase equipment for her job. She is claiming \$8500 in allowable tax deductions.

(a) Determine Lisa's taxable income.

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(b) Using the tax table below, calculate Lisa's tax payable

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<i>Taxable income</i>	<i>Tax payable on this income</i>
\$0 to \$18 200	Nil
\$18 201 to \$37 000	19c for each \$1 over \$18 200
\$37 001 to \$90 000	\$3 572 plus 32.5c for each \$1 over \$37 000
\$90 001 to \$180 000	\$20 797 plus 37c for each \$1 over \$90 000
\$180 001 and over	\$54 097 plus 45c for each \$1 over \$180 000

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Question 28 (4 marks)

A bag contains 9 blue lollies and 7 green lollies.

Georgia takes out a lolly from the bag without looking and eats it. She then takes out another lolly without looking and eats it.

- (a) What is the probability of Georgia choosing a blue lolly in her first selection? **1**

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- (b) By drawing a tree diagram, or otherwise, find the probability that Georgia eats two lollies of different colours. Express your answer as a fraction or correct to 3 decimal places. **3**

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Question 29 (3 marks)

The table below shows Bob's scores in PDHPE and Biology examinations, as well as the mean and standard deviation for each subject. **3**

	PDHPE	Biology
μ	65	80
σ	4	3
Bob's Score	74	84

Explain whether PDHPE or Biology was his stronger subject. Show mathematical calculations to support your reasoning.

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Questions 16-29 are worth 43 marks in total
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Question 30 (3 marks)

Ahmed has a credit card with no interest-free period and he receives a credit card bill at the end of each month. Interest on each purchase is charged at the end of each month at a rate of 26.4% p.a. compounded daily from the date of purchase (included) to the last day of the month (included).

3

Ahmed's credit card statement for August is shown with the interest charged and closing balance figures missing.

Credit Card Statement			
Statement period: 1 August to 30 August			
Opening Balance:			\$0.00
Purchases:			
8 August	Hi-Fi Speakers	\$425.00	
Interest Charged:			???
Closing Balance:			???

The minimum payment is \$20.00 or 10% of the closing balance, whichever is greater.			

Calculate Ahmed's minimum payment for the August billing period.

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Question 31 (5 marks)

A project requires activities A to G to be completed. The activity chart below shows the immediate prerequisite(s) and duration for each activity.

Activity	Immediate Prerequisite(s)	Duration (hours)
A	—	5
B	—	2
C	A	3
D	B	4
E	C	1
F	D, E	4
G	F	6

(a) Draw a network diagram illustrating this situation.

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(b) Using your diagram, determine the minimum completion time of the project.

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(c) Hence, or otherwise, find the float time for activity D .

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Question 32 (4 marks)

The time it takes for Alex to drive to work varies inversely with the average speed at which he travels.

When Alex travels at an average of 56 km/h, it takes him 1 hour and 15 minutes to get to work.

Let t represent the time taken to drive to work in hours and let s represent the average speed Alex drives in kilometres per hour.

Let k be the constant of variation.

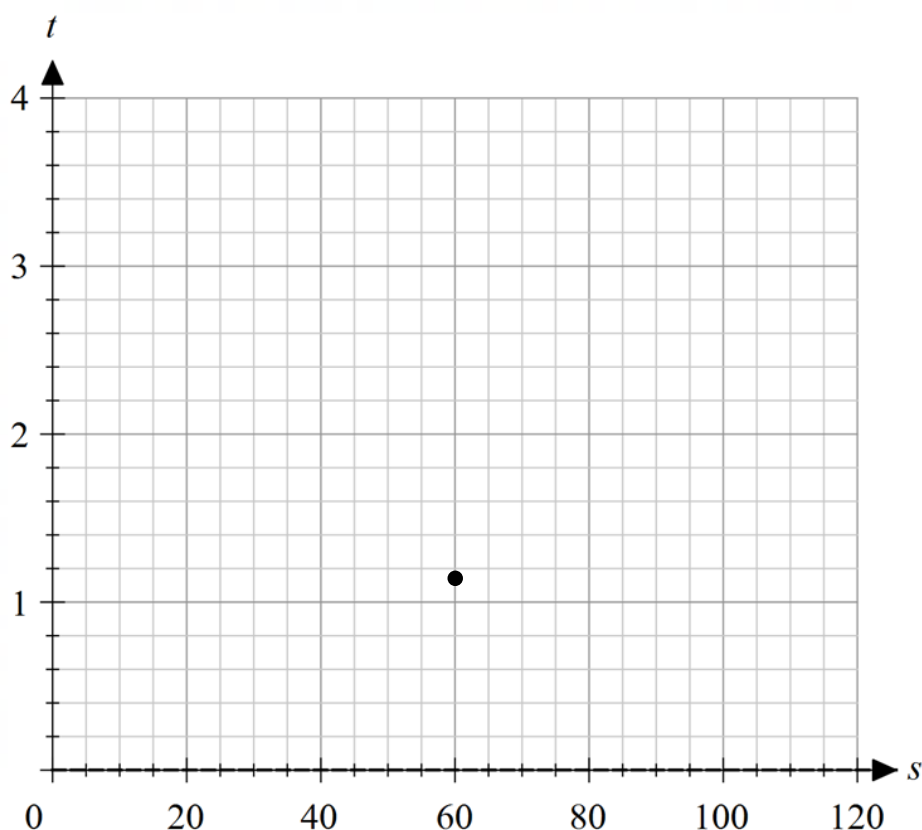
- (a) Write an equation representing the relationship between t , s and k . 1

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- (b) Hence, or otherwise, find the value of k . 1

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- (c) Plot the curve representing the relationship between t and s on the axes provided. One point on the curve is shown. Draw the curve through correct values for $s = 20, 40, 80$, and 100 . 2



Question 33 (4 marks)

The weights of adult carp are normally distributed. The mean weight is 3.6 kg and the standard deviation is 0.8 kg.

- (a) A carp has a z-score of -1.7 . How heavy is this carp? 2

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- (b) What percentage of adult carp would you expect to weigh more than 4.4 kg? 1

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- (c) A fisherman is claiming that he caught an adult carp that weighed 7 kg. Justify why the fisherman's claim is almost certainly false. 1

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Question 34 (3 marks)

Alan purchased a truck for \$241 000. After 5 years its market value is \$22 3500. The value of the truck decreases by a constant amount every year.

- (a) What is the annual amount of depreciation? 1

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- (b) Let t be the number of years after the truck was purchased, and V be the value of the truck after t years. Express the situation above as a linear equation. 1

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- (c) Hence, or otherwise, find the value of Alan's truck after 11 years. 1

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Question 35 (2 marks)

Julia is planning to put money aside to save for an overseas trip in 3 years from now. She can afford to contribute \$4200 at the end of each year into an annuity that pays interest at 5.4% p.a., compounded annually. 2

How much will she have saved up after the 3 years?

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Question 36 (2 marks)

A map has a scale of 1:20000

(a) Two schools are 4 cm apart on the map. What is the actual distance between the two schools, in metres? 1

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(b) Two towns are 4200 m apart. How far apart should the towns be on the map, in centimetres? 1

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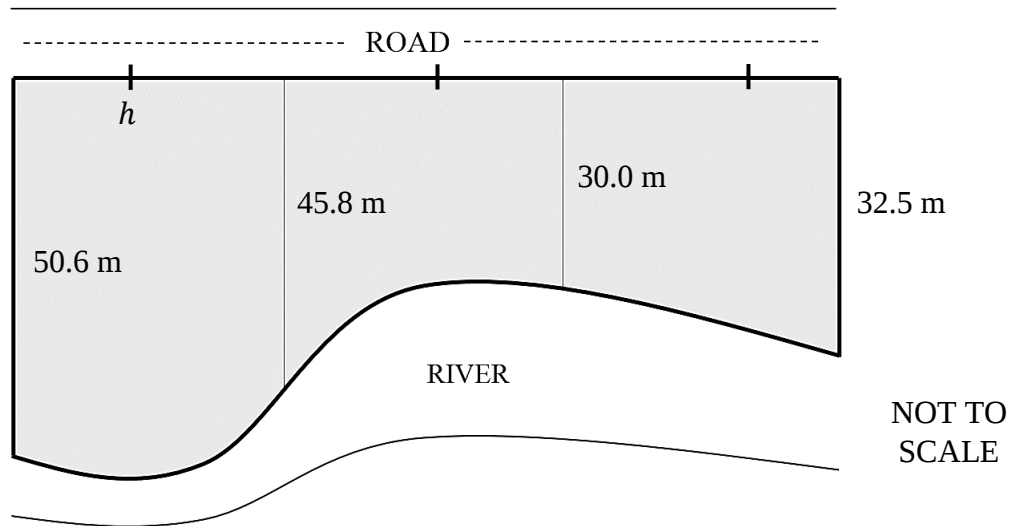
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Question 37 (4 marks)

A field (shaded) is bordered on one side by a 120 metre road and on the other side a river. Measurements are taken from the road to the river, as shown.



- (a) Find the value of h . 1

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- (b) Use the trapezoidal rule to find an approximation to the area of the field. 3

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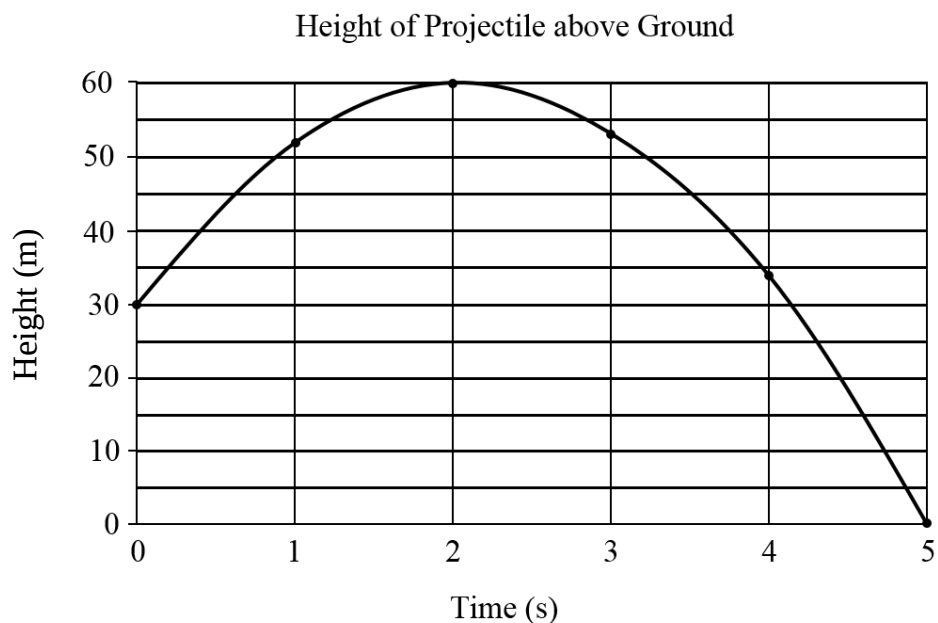
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Question 38 (4 marks)

In a science experiment, a projectile was thrown from the top of a building. The height of the projectile above the ground was recorded at 1 second intervals. The results are shown in the graph below.



- (a) What was the height of the building? 1

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- (b) According to the graph, approximately what maximum height above the ground was reached by the projectile? 1

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- (c) The height, h (in metres), of the projectile above the ground a certain time t (in seconds) after it was thrown, can be modelled by the formula: 1

$$h = 30 + 29t - 7t^2$$

Use this formula to predict the height of the projectile after 2.5 seconds.

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- (d) Explain why this model is unreliable for values of t which are greater than 5. 1

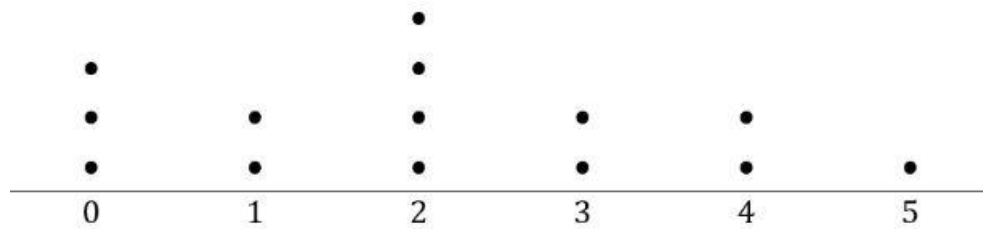
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Question 39 (2 marks)

14 people were asked to indicate the time (in hours) they had spent watching television on the previous night. The results are displayed in the dot plot below. 2



Find the mean and population standard deviation of these times. Correct your answers to one decimal place.

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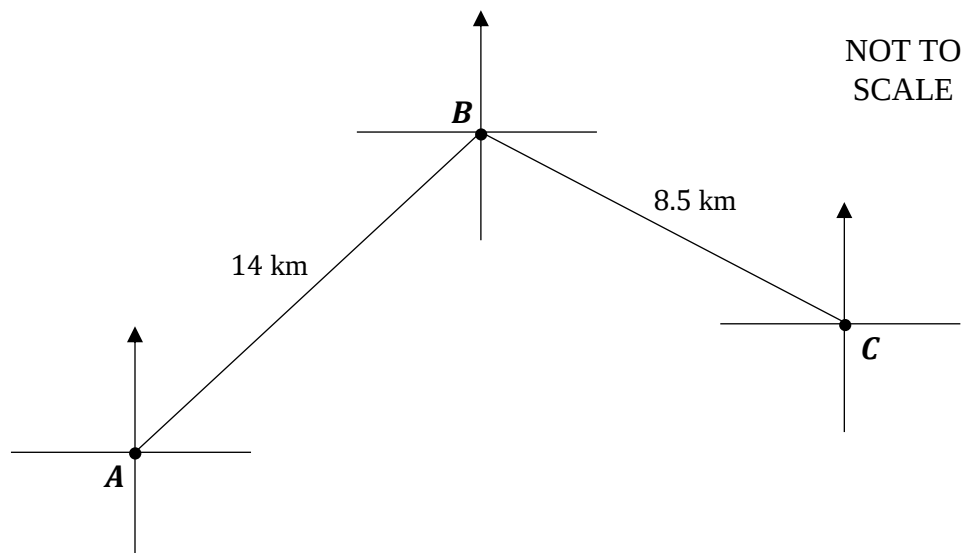
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Question 40 (5 marks)

A class is on a hike as part of their PE course. They are given the following directions from starting point A :

They are to walk on a bearing of 062° for 14 kilometres to point B . Then, they continue on a bearing of 136° for 8.5 kilometres to point C , before returning to starting point A .



- (a) Explain why $\angle ABC = 106^\circ$. 1

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- (b) Calculate AC , the distance that the class needs to travel on the final section of their hike. Give your answer in kilometres, correct to 2 decimal places. 2

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- (c) Find the bearing that the class needs to take from point C to return to starting point A , to the nearest degree. 2

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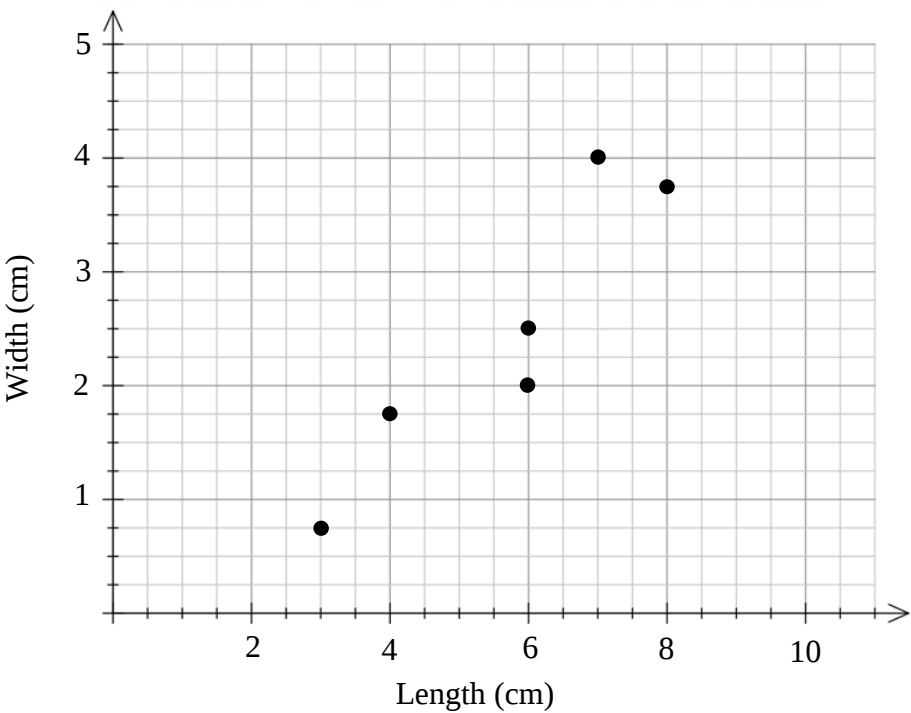
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Question 41 (4 marks)

A set of bivariate data is collected by measuring the length and width of leaves found on a plant. The graph shows a scatterplot of these measurements.



This data is also displayed in the table below, including the mean and standard deviation.

							Mean	Standard Deviation
Length (cm)	3	4	6	6	7	8	5.67	1.7
Width (cm)	0.75	1.75	2	2.5	4	3.75	2.46	1.13

- (a) Pearson’s correlation coefficient for this data is approximately 0.92. Use your calculator to verify the value of the correlation coefficient, by giving your value to three decimal places.

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Question 41 continues on page 32

- (b) By using the following formulae and the information provided, find the equation of the least-squares line of best fit, with values correct to 2 decimal places. 3

Express your equation in the form $y = \text{gradient} \times x + y\text{-intercept}$.

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

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

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HHHS – 2020 Mathematics Standard 2 Trial – Solutions

SECTION 1

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2	C	
3	C	
4	A	
5	D	
6	A	
7	B	
8	A	
9	C	
10	B	
11	A	
12	A	
13	D	
14	B	
15	D	

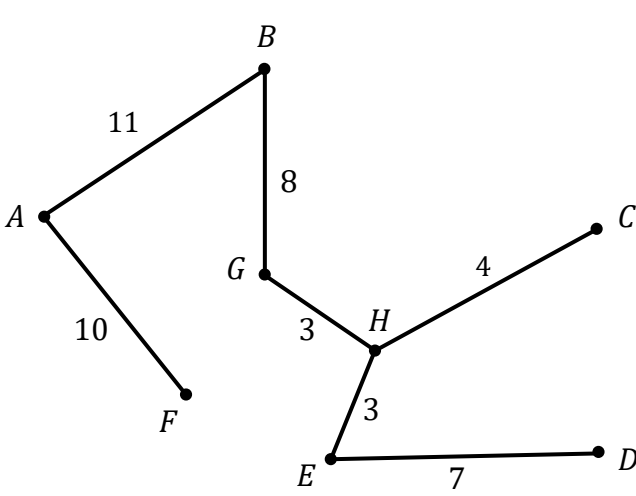
SECTION II

16	Error with question. Either of the following are correct: $V = \frac{1}{3}Ah$ $= \frac{1}{3} \times \pi \times 6^2 \times 15$ $= 565 \text{ cm}^3$	2 – Correct solution & evidence of use of volume of cone 1 – Evidence of use of volume of cone (A mark is deducted for rounding error here)
17	$\frac{4 + 7x}{8} = 4$ $4 + 7x = 32$ $7x = 28$ $x = 4$	3 – Correct solution and working. 2 – Two correct steps towards solution 1 – Any 1 correct step towards solution or only solution provided.
18	$\sin 75^\circ = \frac{5}{x}$ $x = \frac{5}{\sin 75^\circ}$ $x = 5.18 \text{ m}$	2 – Correct working and solution 1 – Identifies correct trigonometric ratio OR correct process with incorrect ratio 0 – Incorrect working out and/or incorrect solution only
19	$S = V_0(1 - r)^n$ $= 48500(1 - 0.098)^4$ $= \$32105$	2 – Correct working and solution 1 – Clear evidence of use of declining balance formula

20 a)	$Q_1 = 12$ $Q_3 = 15$	2 – Both values correct 1 – One value correct
20 b)	$IQR = 3$ 23 is an outlier if it is more than $Q_3 + 1.5 \times IQR$ $Q_3 + 1.5 \times IQR = 15 + 1.5 \times 3$ $= 19.5 < 23$ $\therefore 23$ is an outlier.	2 – Correct use of outlier equation, IQR and concluding statement 1 – Correct interquartile range calculated 0 – Statement of 23 an/not an outlier without calculations.

21	3400 watt = 3.4 kW 105 minutes = 1 hour and 45 minutes $= 1.75$ hours 35.82 cents = \$0.3582 Total Cost = $3.4 \times 1.75 \times \$0.3582$ $= \$2.13$	2 – Correct solution and working 1 – Any correct conversion of units or process required
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22 a)	E.g.: Line l represents the amount earned from charging \$15 for each attendee.	1 – Correct explanation 0 – Incorrect or vague explanation of line (such as ‘profit’, ‘number of people’, etc.)
22 b)	Break-even point, where cost to host event will be same as income from people attending.	1 – Correct explanation 0 – Incorrect explanation or no/vague explanation of significance of the point
22 c)	From graph, $\$500 - \$300 = \$200$	1 – Correct solution provided

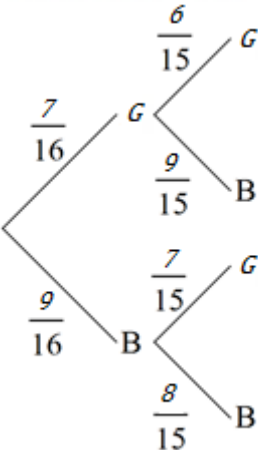
23 a)	 There is only one MST which is any isomorphic to the one above.	3 - Correct diagram with all labelled vertices and edges 2 - Correct diagram with 1 or 2 mistakes/missing labels 1 – Any evidence of MST being constructed correctly
23 b)	Weight = 46 $\therefore \text{Cost} = 46 \times \$1000 = \$46000$	1 – Correct solution provided 0 – Incorrect cost

24 a)	$\text{Total Cost} = 800 \times \3.25 $= \$2600$ $\text{Brokerage Fee} = 0.02 \times \2600 $= \$52$	1 – Correct solution provided
24 b)	$\text{Amount from Selling Shares} = \4×800 $= \$3200$ $\therefore \text{Profit} = \$3200 - \$52 - \2600 $= \$548$	1 – Correct solution provided
24 c)	$\text{Dividend Yield} = \frac{0.75}{4}$ $= 0.1875$ $\therefore \text{Percentage Dividend Yield} = 18.75\%$	1 – Correct solution provided

25 a)	$\text{Amount Repaid} = \$6000 \times 4 \times 20$ $= \$480000$	1 – Correct solution provided
25 b)	$\text{Interest} = \$480000 - \350000 $= \$130000$	1 – Correct solution provided
25 c)	$A = \$3475$ $B = \$344975$	2 – Correct answer given for both values 1 – Correct answer given for one value

26 a)	$BAC = \frac{10 \times (0.7 \times 5) - 7.5 \times 3}{6.8 \times 80}$ $= 0.023 \approx 0.02$	2 – Correct substitution and answer 1 – Correct substitution or answer only
26 b)	$\text{Time} = \frac{0.02}{0.015}$ $= 1.333 \dots$ $= 1 \text{ hour and } 20 \text{ minutes}$	2 – Correct conversion of units and correct answer 1 – Correct substitution or solution

27 a)	$\text{Taxable Income} = \text{Gross Income} - \text{Allowable Tax Deductions}$ $= (\$92500 + \$3000) - \$8500$ $= \$87000$	1 – Correct solution provided
27 b)	$\text{Tax Payable} = \$3572 + 0.325 \times (87000 - 37000)$ $= \$19822$	2 – Correct solution or correct working provided 1 – Evidence of correct taxable income bracket

28 a)	9 blue out of 16 total: $P(\text{Blue}) = \frac{9}{16}$	1 – Correct solution provided
28 b)	$P(GB) = \frac{7}{16} \times \frac{9}{15} = \frac{21}{80}$ $P(BG) = \frac{9}{16} \times \frac{7}{15} = \frac{21}{80}$ $P(BG \text{ or } GB) = \frac{7}{30} + \frac{21}{80} = 0.525 \text{ or } \frac{21}{40}$ 	3 - Provides correct solution with working and/or diagram 2 – Provides correct working towards solution 1 – Evidence of correct attempt to construct tree diagram or calculate the probabilities of event

29	From reference sheet, $z = \frac{x-\mu}{\sigma}$ PDHPE $z = \frac{74 - 65}{4}$ $= 2.25$ Biology $z = \frac{84 - 80}{3}$ $= 1.333 \dots$ Bob's z-score for PDHPE is higher than Biology, so he performed better relative to the class than in Biology (despite a lower mark). PDHPE is his stronger subject.	3 - Correct conclusion and calculations 2 - Any correct working towards solution 1 - Evidence of use of z-scores
30	Hi-Fi Speakers Days: 23 $FV = 425 \left(1 + \frac{0.0264}{365}\right)^{23} = \$432.126 \text{ (Closing Balance)}$ 10% of closing balance: $10\% \times \\$432.126 = \\43.21 Minimum payment: \$43.21 (As it is greater than \$20).	3 - Provides the correct solution and working 2 - Calculates the FV or interest of the purchase, or any error 1 - Uses the compound interest formula

31 a)	Any diagram matching the table.	3 - Correct diagram with all labelled edges 2 - Correct diagram with one or two mistakes/missing labels/arrows 1 - Provides attempt to construct diagram Note: LST and EST not required/marked here
31 b)	19 hours (Note: Students will require finding the EST using their diagram)	1 – Correct solution provided
31 c)	Float Time for D is 3 hours (Note: Students will require finding the EST and LST using their diagram)	1 – Correct solution provided

32 a)	Varies inversely, so: $t = \frac{k}{s}$	1 – Correct equation provided or equivalent.
32 b)	When $t = 1.25, s = 56$ $\therefore 1.25 = \frac{k}{56}$ $k = 70$ (Also, the equation is $t = \frac{70}{s}$)	1 – Correct value of k provided
32 c)	The graph should go through four correct values in addition to the provided point.	2 - Provides a graph that goes through the correct values for $s = 20, 40, 80$, and 100 1 - Draws a graph going through the provided point, in the shape of a hyperbola or any 1 error

33 a)	From reference sheet, $z = \frac{x-\mu}{\sigma}$ $-1.7 = \frac{x - 3.6}{0.8}$ $-1.36 = x - 3.6$ $\therefore x = 2.24$	2 – Correct solution and working provided 1 – Correct substitution into z-score formula
33 b)	4.4 kg is 1 z-score above the mean. 1st half = 50% From $z = 0$ to 1 is 34% $\therefore$ Percentage of carp that weighs less than 4.4 kg is 84% $\therefore$ Percentage of carp weighing more than 4.4kg is 16%	1 – Correct solution provided
33 c)	An adult carp weighing 7 kg is over 4 z-scores over the mean. This means that this carp will weigh more than 99.7% of all adult carp. Therefore, the fisherman's claim is very unlikely to be true.	1 – Correct solution and/or explanation provided

34 a)	Annual Depreciation = $(\\$241000 - \\$223500) \div 5$ $= \$3500$	1 – Correct solution provided
34 b)	$V = 241000 - 3500t$	1 – Correct equation provided
34 c)	When $t = 11$, $V = 241000 - 3500 \times 11$ $\therefore V = 202500$	1 – Correct solution provided

35	$V_0 = 0$ $V_1 = 0(1 + 0.054) + 4200$ $= \$4200$ $V_2 = \$4200(1 + 0.054) + 4200$ $= \$8426.80$ $V_3 = \$8426.80(1 + 0.054) + 4200$ $= \$13292.65$ $\therefore$ Julia will have saved up \$13292.65	2 – Correct solution and working provided 1 – Any correct working of calculating annuity for any year
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36 a)	1 : 20000 4 : 80000 $\therefore$ 4 cm on map = 80000 cm actual distance $= 800 \text{ m}$	1 – Correct solution provided
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36 b)	$4200 \text{ m} = 420000 \text{ cm}$ $1 : 20000 = ? : 420000$ $\therefore 21 \text{ cm on map.}$	1 – Correct solution provided
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37 a)	$x = 120 \div 3 = 40 \text{ m}$	1 – Correct solution provided
37 b)	$\text{Total Area} = \frac{40}{2}(50.6 + 45.8) + \frac{40}{2}(45.8 + 30) + \frac{40}{2}(30 + 32.5)$ $= 4694 \text{ m}^2$	3 - Provides the correct solution and working 2 - Correct mathematical working towards solution 1 - Uses the area of a trapezium or trapezoidal rule formula

38 a)	Height of Building = 30 m	1 – Correct solution provided
38 b)	Maximum Height Above Ground = 60 m	1 – Correct solution provided
38 c)	$h = 30 + 29(2.5) - 7(2.5)^2$ $\therefore h = 58.75 \text{ m}$	1 – Correct solution provided
38 d)	After $t = 5$, the projectile hits the ground (and would not be considering these values).	1 – Correct solution provided

39	Using a calculator, $\bar{x} = \frac{0 + 0 + 0 + 1 + 1 + 2 + 2 + 2 + 2 + 3 + \dots}{14}$ $= 2.1$ $s = 1.5$	2 - Correct solutions provided for both mean and standard deviation 1 - Correct solution provided for only mean or standard deviation
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40 a)	$\angle ABC = 106$ because it is made up of two angles 62° (alternate angles) and 44° (supplementary angles/angles on a straight line).	1 – Correct explanation provided
40 b)	Using the cosine rule in the formula sheet, $c^2 = a^2 + b^2 - 2ab \cos C$ $= 14^2 + 8.5^2 - 2(14)(8.5) \cos 106^\circ$ $= 333.852 \dots$ $\therefore c = 18.27 \text{ km}$	2 - Provides the correct solution and working 1 - Correctly uses and substitutes values into cosine rule, or equivalent merit
40 c)	$\frac{\sin x^\circ}{8.5} = \frac{\sin 106^\circ}{18.27}$ $\sin x^\circ = 0.44722 \dots$ $\therefore x^\circ = 26.57^\circ$ $\therefore \text{Bearing is } 180 + 62 + 26.57 = \mathbf{269^\circ}$	2 - Provides the correct solution and working 1 – Any correct working out towards solution

41 a)	0.925	1 – Correct value provided
41 b)	$\text{Gradient} = 0.92 \times \frac{1.13}{1.7}$ $= 0.6115$ $y\text{-intercept} = 2.46 - 0.6115 \times 5.67$ $= -1.00$ $\therefore$ The equation of the least squares line of best fit is $y = 0.61x - 1.00$ Note: EC from incorrect gradient or using 0.925 from a)	3 - Correct gradient and y-intercept calculated with equation of line 2 - Correct gradient or y-intercept calculated 1 - Attempt to use any formulae