Student Number ☐☐☐☐☐☐☐☐☐

2020
TRIAL
EXAMINATION

Manly Campus - Northern Beaches Secondary College

Mathematics Standard 2

General Instructions	• Reading time – 10 minutes
	• Working time – 2 hours and 30 minutes
	• Write using black pen
	• NESA approved calculators may be used
	• A reference sheet is provided.
	• For questions in Section II, show relevant mathematical reasoning and/or calculations

Total Marks: **100**	**Section I – 15 marks** (pages 2 - 9)
	• Attempt Questions 1–15
	• Allow about 25 minutes for this section
	Section II – 85 marks (pages 10 - 29)
	• Attempt Questions 16–39
	• Allow about 2 hours and 5 minutes for this section

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

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

1   The Coordinated Universal Time (UTC) of Sydney, Australia is +10 hours and the UTC of Mexico City, Mexico is −5 hours.

What is the time in Mexico City if it is 8 am on Monday in Sydney?

A   5 pm Sunday

B   1 pm Monday

C   3 pm Sunday

D   1 am Tuesday

2   The military in Australia is organised in ranks such as Private or Sergeant.

What sort of data is represented by these?

A   Ordinal

B   Nominal

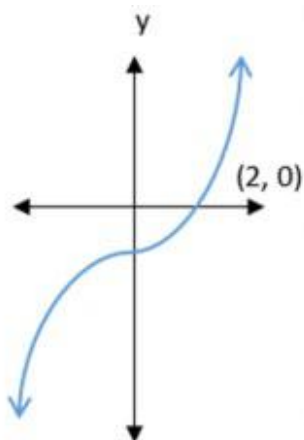**C**   Nominal and ordinal

D   Neither nominal nor ordinal

3   In 1903 the fastest recorded speed on a motor bike was 103 kilometres per hour.
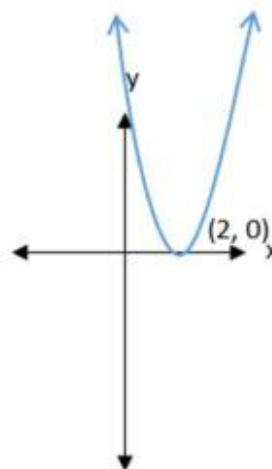Express this as a rate in metres per second, to one decimal place.

A   1.7 m/s

B   6.18 m/s

C   28.6 m/s

D   37.1 m/s

4 Which of the following graphs could represent the function, $y = x^2 + 2$?

A

(2, 0)

B

(2, 0)

C

(0, 2)

D

(0, 2)

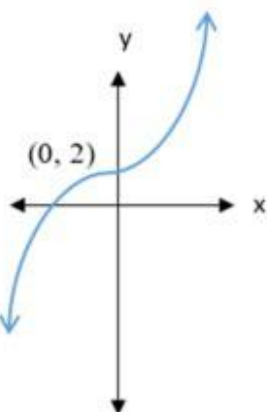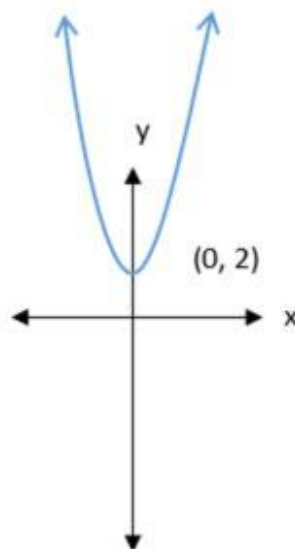**5** A television costs $1299, inclusive of 10% GST.

What is the price of the television before GST, correct to the nearest dollar?

A $130

B $1149

C $1169

D $1181

6   Phoebe wants to catch a train from Parramatta to Blacktown.

This is the timetable she would use.

Central	06:10	i06:23	06:23	06:25	06:34	-	06:38	06:40	i06:53
Redfern	06:12	--	06:25	06:27	06:36	-	06:40	06:42	--
Burwood	--	--	06:45	--	--	-	07:00	--	--
Strathfield	06:24	06:36	06:48	06:39	06:48	-	07:03	06:54	07:06
Lidcombe	06:30	--	06:56	06:45	--	-	07:11	07:00	--
Auburn	--	--	06:59	--	--	-	07:14	--	--
Clyde	--	--	07:02	--	--	-	07:17	--	--
Granville	--	--	07:03	--	--	-	07:18	--	--
Harris Park	--	--	07:06	--	--	07:01	07:21	--	--
Parramatta	06:37	06:48	07:08	06:52	07:00	07:06	07:23	07:07	07:18
Westmead	06:40	--	-	06:55	07:03	07:09	-	07:10	--
Wentworthville	--	--	-	--	07:05	07:11	-	--	--
Pendle Hill	--	--	-	--	07:08	07:14	-	--	--
Toongabbie	--	--	-	--	07:10	07:16	-	--	--
Seven Hills	06:47	--	-	07:02	07:13	07:19	-	07:16	--
Blacktown	06:51	06:57	-	07:06	07:17	07:23	-	07:20	07:27

What is the latest train Phoebe can catch from Parramatta to arrive at Blacktown station before 7:15 am?

A   6:25 am

B   6:48 am

C   6:52 am

D   7:06 am

7   Sally's six year old daughter is prescribed cough medicine with an adult dosage of 11 mL

Using Young's fomula, calculate the amount of cough medicine Sally should give to her daughter.

$$Young's\ formula = \frac{age\ of\ child\ in\ years\ \times adult\ dosage}{age\ of\ child\ in\ years + 12}$$

A   0.92 mL

B   3.67 mL

C   11 mL

D   66 mL

8 This is a table of compound interest values for $1.

period	Interest rate per period					
	1%	2%	4%	5%	8%	10%
1	1.010	1.020	1.040	1.050	1.080	1.100
2	1.020	1.040	1.082	1.103	1.166	1.210
3	1.030	1.061	1.125	1.158	1.260	1.331
4	1.041	1.082	1.169	1.216	1.360	1.464
5	1.051	1.104	1.217	1.276	1.469	1.611

Table title: **Compounded values of $1**
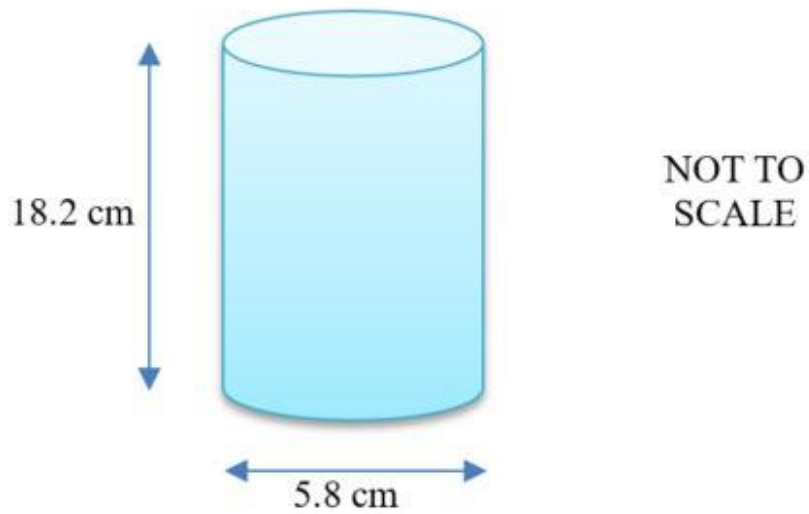
$22 000 is invested and compounded annually at 5%.

Using the table, what is the value of the investment after four years?

A $25 476

B $25 718

C $26 752

D $26 774

9 Which pronumeral represents the angle of depression from the man to the dog?
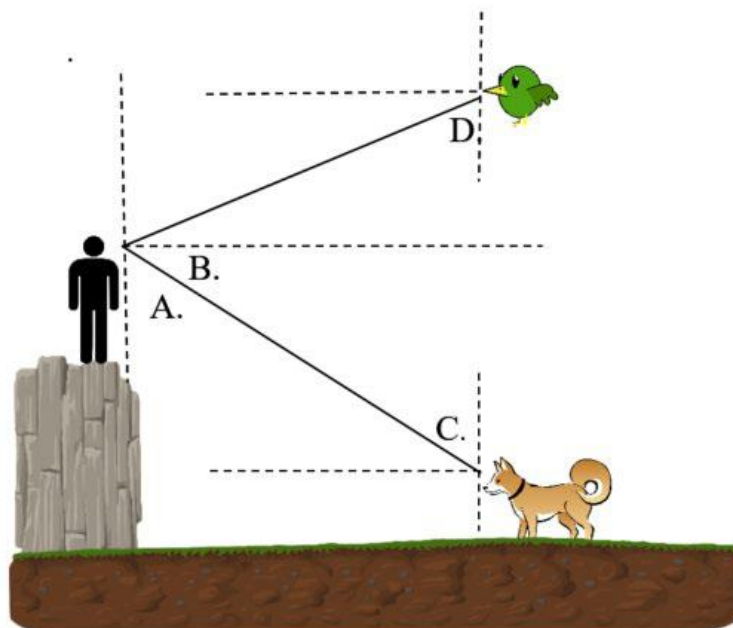
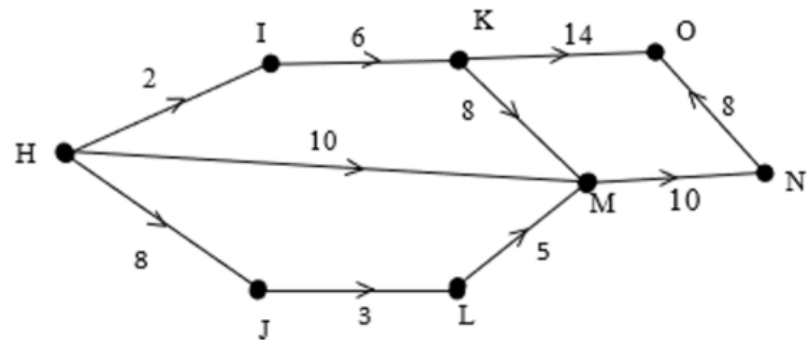**10** What is the surface area of this solid shape?

NOT TO
SCALE

18.2 cm

5.8 cm

A   105.56 cm^2

B   105.68 cm^2

C   384.47 cm^2

D   480.86 cm^2

11 Stanley wants to test the wind speed in different weather conditions in his backyard.

What would be the dependent variable in his experiment?

A   Location

B   Wind speed

C   Equipment used

D   Weather conditions

12   Below is a network flow diagram.

What is H an example of?

A   Sink

B   Path

C   Edge

D   Source

13   A flight between Sydney and the USA takes 14 hours, to the nearest hour. The percentage error in measurement, correct to 2 decimal places is:

A   0.04%

B   2.14%

C   3.57%

D   5.88%

14. Jenna has a credit card with a daily compound interest rate of 0.034%. The card has an interest free period of 60 days. Seventy-five days ago, Jenna made a purchase for $950 and she has not made any further purchases or payments on her credit card. What is the minimum amount of interest Jenna owes on her card?

    A $4.86

    B $16.15

    C $24.23

    D $32.30

15. For the network below, the capacity of the cut shown is:
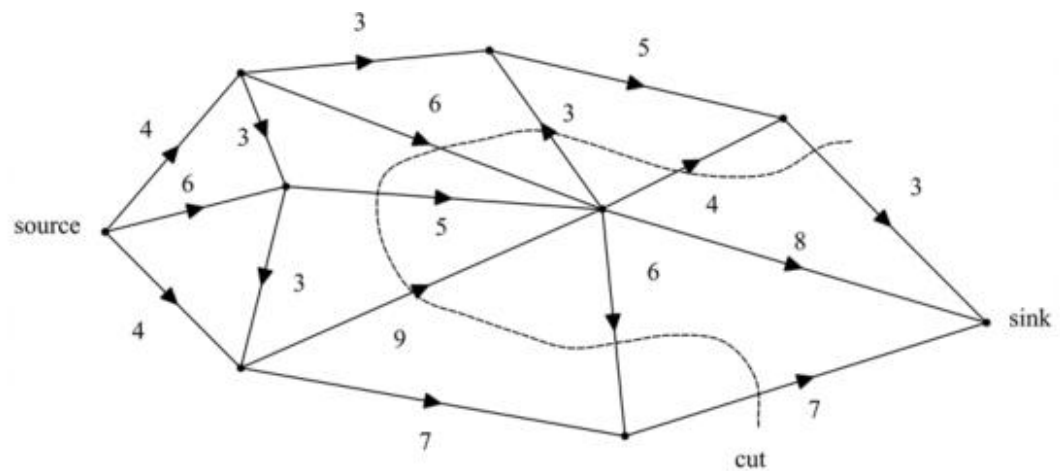
    A 23

    B 30

    C 34

    D 41

End of Multiple Choice

2020 Trial Examination

Manly Campus - Northern Beaches Secondary College

Mathematics Standard 2

Section II Answer Booklet

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

Instructions   • 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.

Question 16 (1 mark)

Solve the equation, $x = \frac{-(y^2+y)}{5}$ for x, if $y = 4$ **1**

Question 17 (2 marks)

Make B the subject of the formula, $S + \left(\frac{Q}{B}\right) = A$ **2**

Question 18 (1 mark)

Last year the world population was 7 577 130 000.

Write this number in scientific notation, correct to four significant figures. **1**

Question 19 (2 marks)

Steven is fishing in a pond containing 32 goldfish, 12 minnow, and 8 perch.

After each catch, Steven releases the fish back into the pond. If Steven plans to catch 25 fish, how many would he expect to be minnows? **2**

Question 20 (3 marks)

Jim wants to get his yard mowed and asks two local businesses for their prices. Business A charges $200 plus $50 for every hour worked and Company B charges no callout fee but $100 for every hour worked.

This relationship is depicted in the graph below.
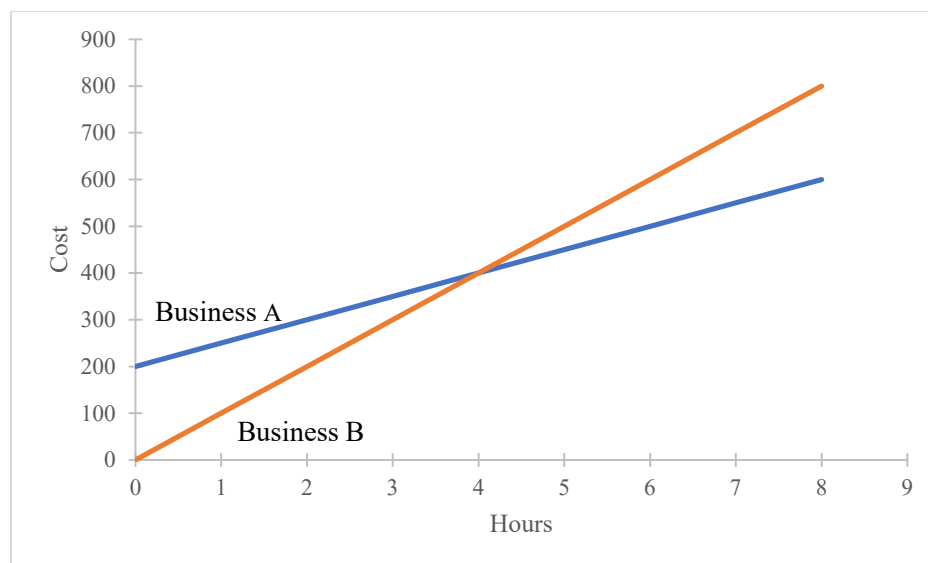
a) Develop a pair of simultaneous linear equations to show cost for hours worked. **2**

b) By using the graph, estimate the time at which both businesses will cost the same and how much it would cost Jim to hire either at this time. **1**

Question 21 (4 marks)

The formula below can be used to estimate the blood alcohol content (BAC) for males.

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

where N is the number of standard drinks consumed, H is the number of hours of drinking, and M is the person's weight in kilograms.

The number of hours required for a person to reach a zero BAC after they stop drinking alcohol is given by the formula:

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

The number of standard drinks is as shown in the table

	No. of Standard Drinks
Wine	1.2
Beer	1
Spirit	1

Elijah was out Saturday night celebrating his team's win. The celebrations started at 8pm and continued until the team's 12:30am curfew. During this time he consumed 8 beers and 3 shots of spirits. He then stopped drinking alcohol.

Using the information and formulas above, and the fact that Elijah weighs 110 kg, determine what time and day his BAC should reach zero. **4**

Question 22 (2 marks)

Harry buys a car for $45 399. It depreciates at 18% per year based on the value at the end of the year.

What will be the value of the car after five years to the nearest dollar? **2**

Question 23 (2 marks)

Sam has a savings account that has a value of $28 395. The interest rate on the account is 4% p.a. compounding quarterly and Sam opened it six years ago with an initial deposit and has since made no further deposits.

Determine the value of the original deposit Sam made. **2**

Questions 16 -23 are worth 17 marks in total
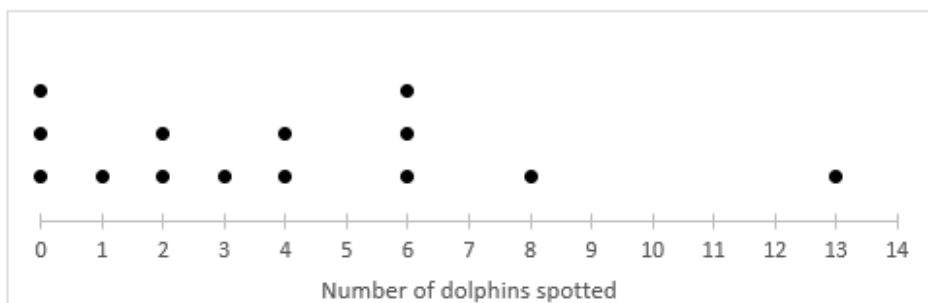
Question 24 (2 marks)

You own 400 shares in GRQ Pty Ltd.

The current share price is $25.12 and your annual dividend income is $282.

What is the dividend yield on your shares? **2**

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_____

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Question 25 (3 marks)

The dot plot below shows the number of dolphins spotted by passengers on a cruise ship each day over a two-week period.
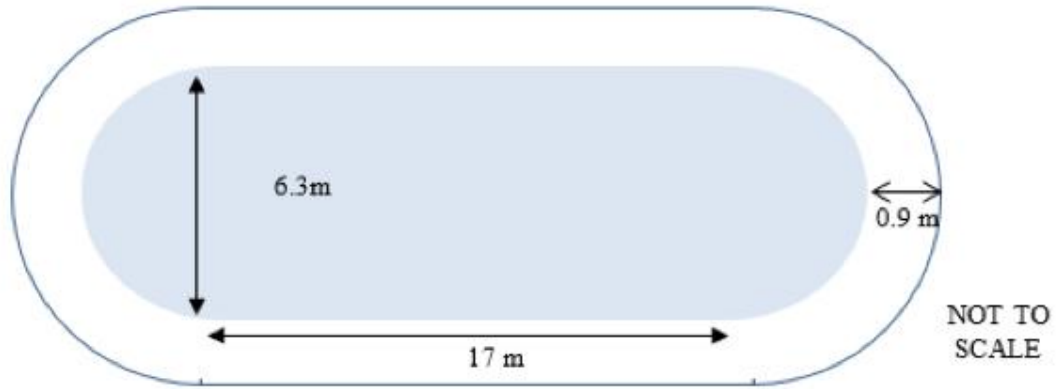

Determine if there are any outliers in the data. Justify your answer with calculations **3**

_____

_____

_____

_____

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Question 26 (6 marks)

A backyard swimming pool is to be constructed based on the plans below. It uses a rectangle 17 metres long and 6.3 metres wide with semicircular ends.

6.3m

0.9 m

17 m

NOT TO SCALE

a) A 0.9 m wide path is to be paved around the outside of the entire pool as shown in the diagram.

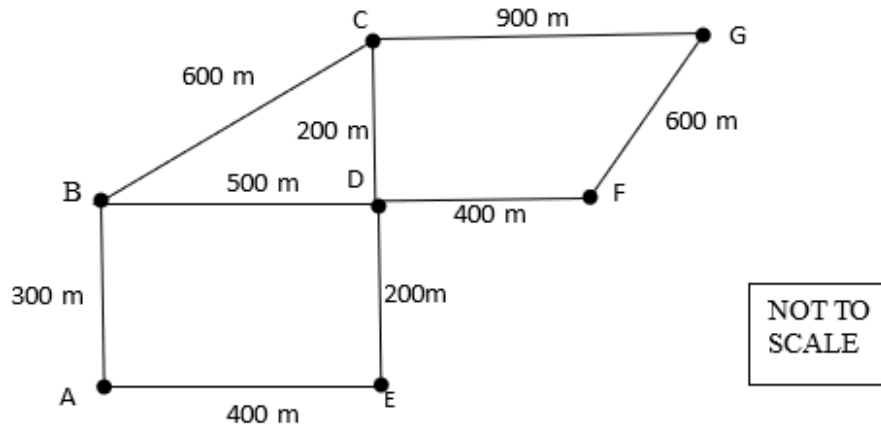Calculate the area to be paved to the nearest square metre.   **4**

b) If the pool is 1.2 metres deep, calculate the volume of water required to fill it completely to the nearest kilolitre   **2**

Question 27 (2 marks)

The diagram below shows the proposed road system for a new neighbourhood.

C — 900 m — G

600 m

200 m

600 m

B — 500 m — D — 400 m — F

300 m   200m

NOT TO SCALE

A — 400 m — E

The council wishes to lay power cable that will connect all points in the neighbourhood.
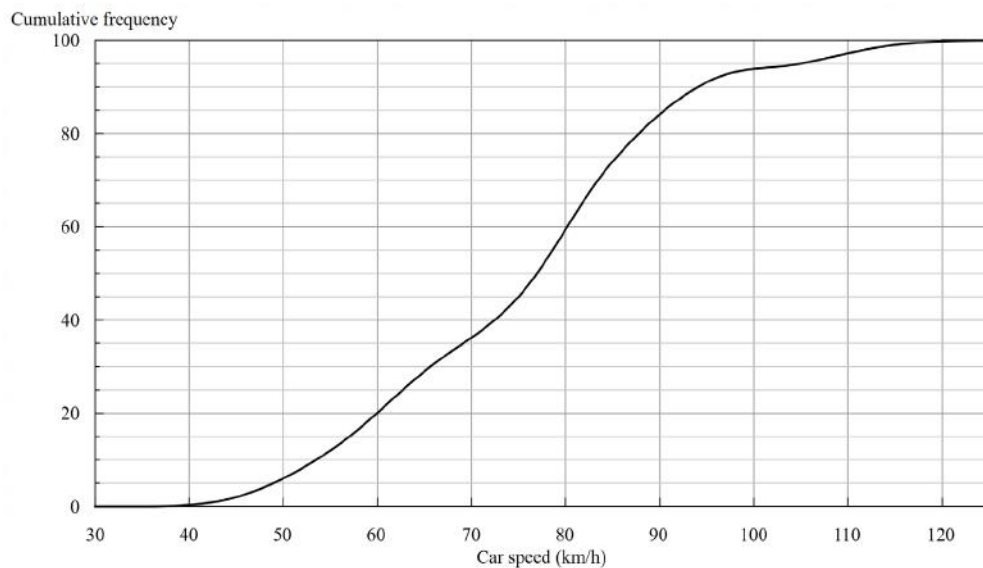
By drawing a minimum spanning tree, calculate the minimum length of cable required. **2**

Minimum length = _____

Questions 16 -27 are worth 30 marks in total

Question 28 (3 marks)

The cumulative frequency polygon shown below is a summary of the recorded speeds of 100 cars travelling around a bend on a country road.

Around this bend, the recommended speed is 60 km/h and the actual speed limit is 80 km/h

a) How many of the cars were travelling above the recommended speed? **1**

_____

_____

b) The technician recording the speed of cars made the following comment:

   "At least half the cars were above the speed limit."

   Is the technician's comment correct? Justify your answer with appropriate calculations and mathematical reasoning. **2**

_____

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Question 29 (6 marks)

Natalie has a gross income of $1585 a fortnight, every fortnight of the year.

Natalie receives dividends of $106 throughout the year, spends $180 on work related expenses and $989 on a new mobile phone for personal use. She also receives 1.2% simple interest on a savings account with a balance of $212 045.

Natalie also donates $50 to charity each month and deducts this from her taxes.

a) Show that Natalie's taxable income is approximately $43 081.   **3**

b) The table below shows different tax payable in Australia according to taxable income

Taxable income ($)	Tax payable
$0 – $18 200	Nil
$18 201 – $37 000	19 cents for each $1 over $18 200
$37 001 – $90 000	$3 572 plus 32.5 cents for each $1 over $37 000
$90 001 – $180 000	$20 797 plus 37 cents for each $1 over $80 000
Over $180 001	$54 096 plus 45 cents for each $1 over $180 000

The Medicare levy in Australia is calculated at 2% of taxable income.

If Natalie has already paid $6887 in tax, will she receive a tax refund or owe money? Justify your answer with calculations   **3**

Question 30 (4 marks)

Eliza is attempting to fill her bathtub with jelly.

In order to dissolve the jelly crystals, she must mix 250 mL of boiling water with every 85 g of crystals.

Eliza can boil up to 10 L at a time in her urn and it takes 8 minutes to boil.

a) Eliza estimates it will take 10.2 kg of crystals to fill the bath.

How long will it take to boil enough water to dissolve this amount of crystals?   **2**

_____

_____

_____

_____

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_____

b) If 30 mL of cold water must then be added for every 17 g of crystals in the mixture, what is the ratio of hot to cold water added to the final mixture?   **2**
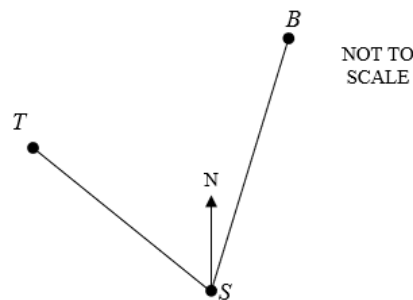
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Questions 16 -30 are worth 43 marks in total

Approximately half way through Section II

Question 31 (5 marks)

Two boys, Tom (*T*) and Brendan (*B*) start at the same point (*S*).

Tom walks on a bearing of 310 degrees for 7 metres and lays a string along his path. Brendan walks on a bearing of 006 degrees for 12 metres and lays a string along his path.

a) Calculate the size of ∠*TSB*.   1

_____

_____

b) Calculate the distance between the boys, to the nearest centimetre.   2

_____

_____

_____

_____

_____

c) A third string is placed directly between the boys to create a triangle.

   Calculate the area of the triangle, to the nearest square metre.   2

_____

_____

_____

_____

_____

Question 32 (6 marks)

Angela receives the following marks, out of 100, on her class assignments. Each assignment has equal weighting.

Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5
78	59	81	73	90

a) Calculate Angela's mean score. **1**

b) If the class average is normally distributed, with a mean of 84.2 and a standard deviation of 8, determine the z -score of Angela's mean. Justify your answer with calculations. **2**

c) What percentage of the class has Angela achieved higher marks than? **1**

d) With two assignments remaining, can Angela achieve the class mean? Assume the class mean does not change and that all assignments are equally weighted. Justify your answer with calculations. **2**
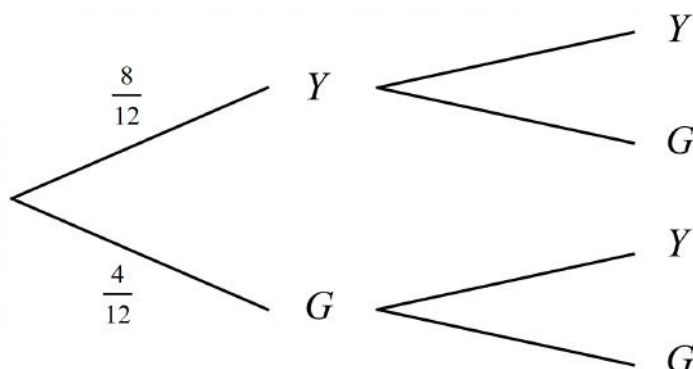
Questions 16 -32 are worth 54 marks in total

Question 33 (6 marks)

Jack reaches into a drawer which contains 8 yellow and 4 green socks. Without replacement, two socks are randomly selected and removed from the drawer

a) Complete the probability tree drawn below **1**

b) Determine whether Jack is more likely to select two socks of the same colour or of different colours. **2**

_____

_____

_____

_____

c) All the socks are returned to the drawer, and some extra yellow or green socks are added to the draw. Jack then randomly selects a single sock.
If the probability that Jack has selected a yellow sock is 0.8, what is the **minimum** number of socks that were added to the draw? **3**

_____

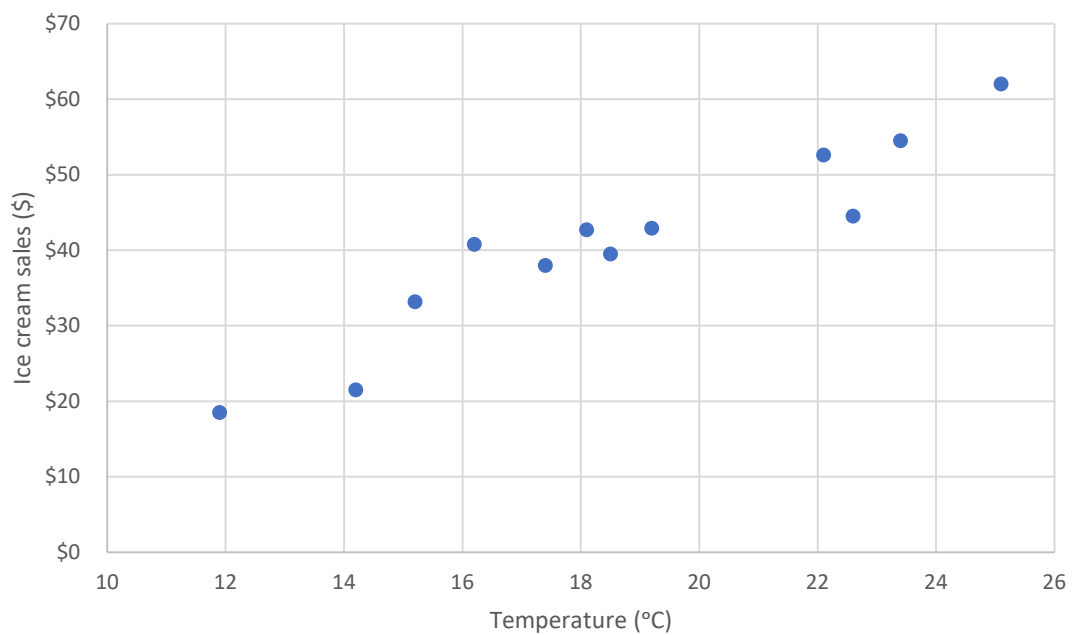_____

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Question 34 (5 marks)

Timmy sets up an ice-cream stall outside his house.

He records the temperature and his total sales each day and graphs the data.

| Temperature T (°C)	14.20	17.40	11.90	15.20	18.50	22.10	19.20	25.10	23.40	18.10	22.60	16.20
Sales, S ($)	22	38	19	33	40	53	43	62	55	43	45	41

a) On the graph above, draw the line of best fit by eye.   **1**

b) Determine the equation of the least squares line of best fit.   **2**

_____

_____

c) Describe the strength and direction of the correlation between ice-cream sales and the temperature   **2**

_____

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Question 35 (4 marks)

The diagram represents an irregularly shaped paddock between a road and a river.
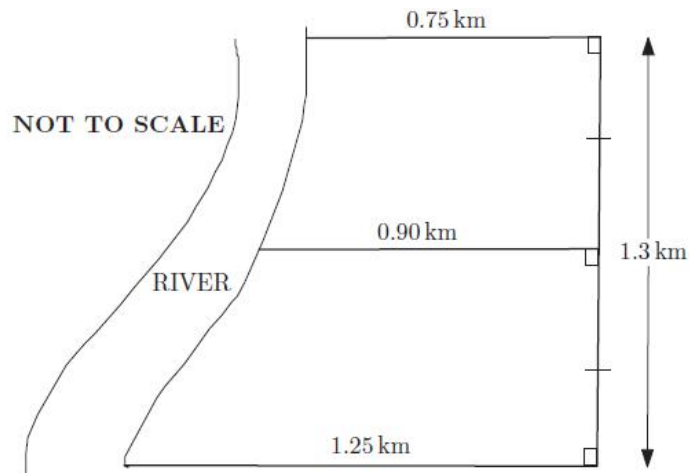
a) Use two applications of the trapezoidal rule to estimate the area of the property. **2**

b) Annual rates payable to the local council are charged at the rate of 0.125 cents per square metre. Calculate the annual rates due for this property. **2**

Questions 16 – 35 are worth 69 marks in total

Question 36 (4 marks)

A rectangular playing surface is to be constructed so that the length is 4 metres more than the width.
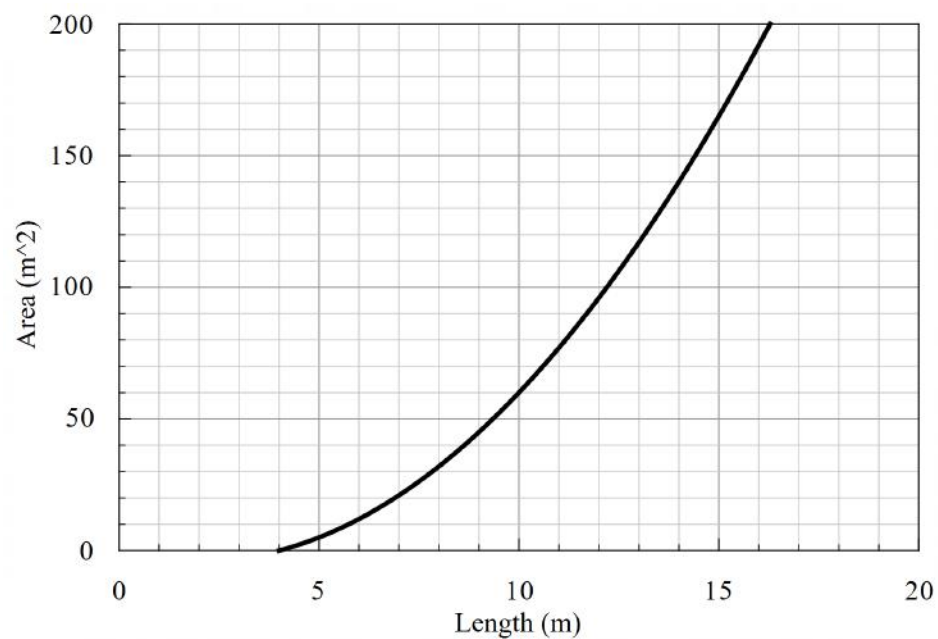
   a) Give an example of a length and width that would be possible for this playing surface.   **1**

_____

_____

   b) Write an equation for the area (A) of the playing surface in terms of its length (l). **1**

_____

_____

 A graph comparing the area of the playing surface to its length is shown.

   c) Why are lengths of 0 to 4 metres impossible?   **1**

_____

_____

   d) What would be the dimensions of the playing surface if it had an area of 117 m²?   **1**

_____

_____

Question 37 (3 marks)

Jas and Joe have a household fridge with an energy rating of 682 kWh per year. They are thinking of buying a bar fridge. The bar fridge they are considering cost $560 and has an energy rating of 352 kWh per year. Their energy plan charges usage at 24.637c/kWh

a) What would be the total cost of purchasing and running the bar fridge for 3 years? **2**

b) What would be the percentage increase in cost of running both fridges compared to just the current fridge? (not including the purchase price) **1**

Question 38 (3 marks)

During COVID19 restrictions there was a limit on the number of people allowed in an enclosed area. The number of people (N) who could be in an enclosed space varied inversely with the area of floor space per person (A).

Before restrictions, a venue could hold 1600 people if each person is allowed $0.5m^2$ of space. How many less people could this venue hold when the COVID19 restrictions required each person to have a minimum of $4m^2$ of space? **3**

Question 39 (6 marks)

Greendale High school is planning to renovate its gymnasium.

This project involves 12 activities, *A* to *L*.

The directed network below shows these activities and their completion times, in weeks.
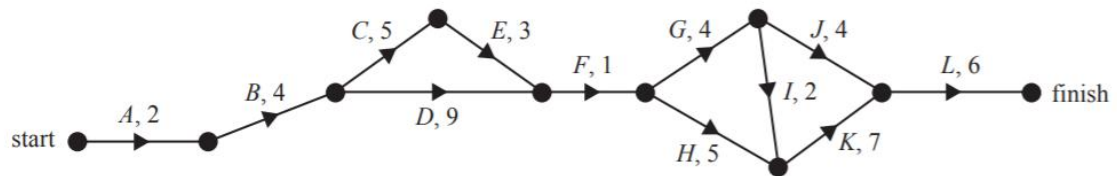
The minimum completion time for the project is 35 weeks.

a) How many activities are on the critical path?   1

b) Determine the latest start time of activity *E*.   1

c) Which activity has the longest float time?   1

d) It is possible to reduce the completion time for activities *C, D, G, H* and *K* by employing more workers. The completion time for each of these activities can be reduced by a maximum of 2 weeks. What is the minimum time, in weeks, that the renovation project could take?   1

Question 39 continues on the next page

Question 39 (continued)

e) The reduction in completion time for each of these five activities will incur an additional cost to the school.

The table below shows the five activities that can have their completion times reduced and the associated weekly cost, in dollars.

Activity	Weekly cost ($)
C	3000
D	2000
G	2500
H	1000
K	4000

The completion time for each of these five activites can be reduced by a maximum of two weeks. Greendale High school required the overall completion time for the renovation project to be reduced by four weeks at minimum cost.

Complete the table below showing the reductions in individual activity completion times that would achieve this. **2**

Activity	Reduction in completion time (0, 1 or 2 weeks)
C	
D	
G	
H	
K	

****************** **End of examination** ****************

Section II extra writing space

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

Section II extra writing space

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

2020 TRIAL
EXAMINATION

Mathematics Standard 2

WORKED SOLUTIONS

Section I 1A, 2A, 3C, 4D, 5D, 6C, 7B, 8C, 9B, 10C, 11B, 12D, 13C, 14A, 15B

Section II

Question 16	
$x = -4$	1

Question 17	
$$\frac{Q}{B} = A - S$$ $$Q = B(A - S)$$ $$B = \frac{Q}{(A - S)}$$	2

Question 18	
7.577×10^9	1

Question 19	
$3 \times 4 = 12$ minnows $\frac{12}{52} = 0.2307$ (expected frequency of one catch) $0.2307 \times 25 = 5.77$ $= 6$	2

Question 20		
(a)	*Business A - C = 200 + 50h* *Business B - C = 100h*	2
(b)	Hours= 4 Cost= $400	1

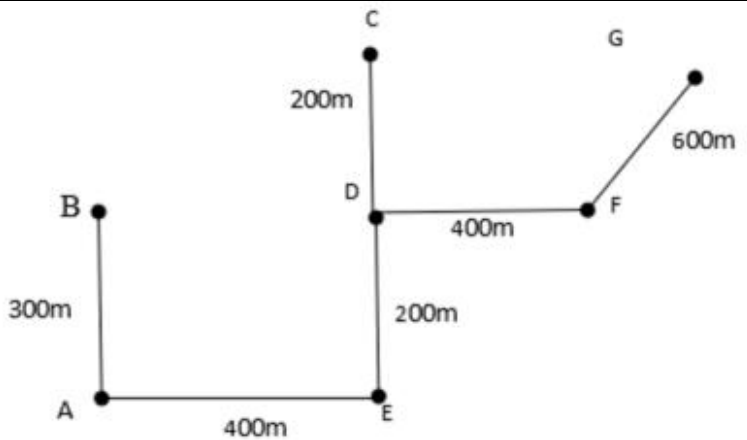| Question 21		
$$BAC_{\text{Male}} = \frac{10 \times 11 - 7.5 \times 4.5}{6.8 \times 110}$$ $$= 0.1019385.....$$ $$\text{Time} = \frac{0.1019385.....}{0.015}$$ $$= 6\text{hr } 48\text{min}$$ Therefore his BAC should reach zero on Sunday morning at 7:18am.		
	Provides correct solution with justification	4
	Calculates correct time for BAC to reach zero	3
	Writes a correct numerical expression for BAC or equivalent	2
	Finds correct value for N or H	1

Question 22	
$S = V_0 (1 - r)^n$ declining−balance method of depreciation $S = 45\,399 (1 - 0.18)^5$ Salvage value = \$16\,831.22 = \$16\,831	2

Question 23	
Use compound interest formula in reverse $$F = P(1 + r)^n$$ $$28\,395 = P(1 + 0.01)^{24}$$ $$P = 22362.94$$	2

Question 24	
Dividend per share is $\frac{282}{400} = \$0.705$ Dividend yield is $\frac{0.705}{25.12} \times 100\% = 2.8065...\% \simeq 2.81\%$	2

Question 25		
	Number of scores $= 14$ Median $= 4$ (Point between 7th and 8th score) $Q_1 = 1$ (4th score) $Q_3 = 6$ (11th score) IQR $= Q_3 - Q_1$ IQR $= 5$ Lower outlier limit $= Q_1 - 1.5 \times$ IQR Lower outlier limit $= 1 - 1.5 \times 5$ Lower outlier limit $= -6.5$ No lower outlier Upper outlier limit $= Q_3 + 1.5 \times$ IQR Upper outlier limit $= 6 + 1.5 \times 5$ Upper outlier limit $= 13.5$ No upper oulier There are no outliers in this data as all scores are between -6.5 and 13.5	3

Question 26		
(a)	$A_{Circle(C)\ outside} = \pi \times 4.04^2$ $$A_{C\ outside} = 51.53 \text{ m}^2$$ $$A_{C\ inside} = \pi \times 3.15^2$$ $$A_{C\ inside} = 31.17 \text{ m}^2$$ $$A_{C\ Total} = 51.53 - 31.17$$ $$A_{C\ Total} = 20.36 \text{ m}^2$$ $$A_{rectangle(r)\ outside} = 17 \times 8.1$$ $$A_{r\ outside} = 137.7 \text{ m}^2$$ $$A_{r\ inside} = 17 \times 6.3$$ $$A_{r\ inside} = 107.1 \text{ m}^2$$ $$A_{r\ Total} = 137.7 - 107.1$$ or $$A_{r\ Total} = 2 \times 0.9 \times 17$$ $$A_{r\ Total} = 30.6 \text{ m}^2$$ $$A = 20.36 + 30.6$$ $$A = 50.96 \text{ m}^2$$ $= 51 \text{ m}^2$	4
(b)	$$V = (31.17 + 107.1) \times 1.2$$ $$V = 166 \text{ m}^3$$ $$V = 166 \text{ kL}$$	2

Question 27

Total distance =
300 + 400 + 200 + 200 + 400 + 600 = 2100 m or 2.1 km

2

Question 28

(a)	80 cars were above the recommended speed of 60 km/h	1
(b)	The statement is incorrect. From the graph, the (approximate) median speed is 77 km/h, which is below the speed limit of 80 km/h. Half of the cars are below 77 km/h. Alternatively – from the graph 40% of cars are above 80 km/h	2

Question 29

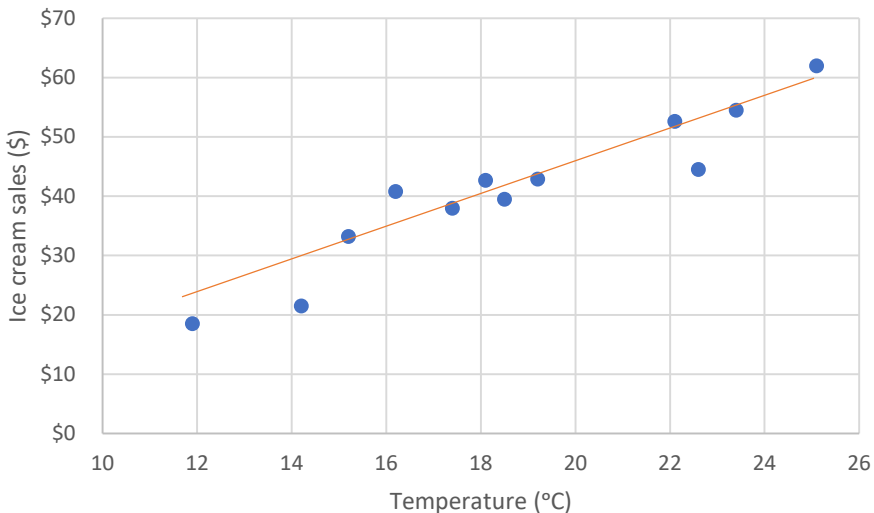|		
(a)	*Gross income* $$= (1\,585 \times 26)_{Salary} + 106_{dividends}$$ $$+ 0.012 \times 212045_{interest} = \$43\,860.54 \approx \$43\,861$$ $$\text{Deductions} = 180_{work\ expenses} + 50 \times 12_{donations} = \$780$$ $$\text{Taxable income} = \$43\,081$$	3
(b)	$$(3\,572 + 0.325(43\,081 - 37\,000))_{Based\ on\ tax\ bracket}$$ $$+ 0.02 \times 43\,081_{medicare\ levy}$$ $$6887 - 6409.95 = 477.05$$ Natalie will receive a tax return of \$477.05	3

Question 30		
(a)	$\dfrac{10\ 000}{250} x\ 85 = 3400$ g (maximum crystals dissolved in 8 mins) $\dfrac{10.2}{3.4} = 3$ (number of times required to fill the urn) $$3 \times 8$$ $= 24$ minutes	2
(b)	$$\dfrac{30}{17} \times 10\ 200 = 18\ \text{L } cold\ water$$ $$10\ 000 \times 3 = 30\ \text{L } hot\ water$$ Ratio hot:cold $= 30{:}18$ $$= 5{:}3$$	2

Question 31	
a) Internal angle $= 50° (\angle TSN) + 6°(\angle NSB) = 56°$ b) $$c^2 = a^2 + b^2 - 2abCos(C)$$ $$TB = \sqrt{49 + 144 - 2 \times 7 \times 12 \times Cos(56°)}$$ $$TB = 9.95 \text{ m}$$ c) $$A = \dfrac{(a + b) \times SinC°}{2}$$ $$A = \dfrac{(7 + 12) \times Sin56°}{2}$$ $$A = 35 \text{ m}^2$$	5

Question 32		
(a)	$$\frac{78 + 59 + 81 + 73 + 90}{5}$$ $$= 76.2$$	1
(b)	$$z = \frac{x - \mu}{\sigma}$$ $$z = \frac{76.2 - 84.2}{8}$$ $$z = -1$$ *Need to show calculations for full marks*	2
c)	Angela has a z-score of -1, hence is 1 standard deviation below the mean. 68% of students in a normal distribution have a z-score between -1 and 1, hence 34% have a z-score of between 0 and -1. 50% of students have a z-score above 0 $$100 - (50 + 34)$$ $$= 16\%$$	1
d)	$$84.2 \times 7 - 381 = 208.4$$ $$\frac{208.4}{2} = 104.2\%$$ No, Angela cannot achieve the class mean as it would require scoring>100% in the final exam. OR Assume Angela scores 100% on both exams: Highest possible Total mark = $78 + 59 + 81 + 73 + 90 + 100 + 100 = 581$ Highest possible average = $\frac{581}{7} = 83$ No, Angela could not achieve the class mean as she could only average 83 if she scored 100% on all remaining assignments.	2

Question 33		
(a)		2

(b)	$P(\text{same colour}) = P(YY) + P(GG)$	2
	$$= \frac{8}{12} \times \frac{7}{11} + \frac{4}{12} \times \frac{3}{11}$$	
	$$= \frac{68}{132}$$	
	$$= \frac{17}{33} > \frac{1}{2}$$	
	Hence it is more likely to choose two socks of the same colour than different colours.	
c)	$$P(Y) = 0.8 = \frac{4}{5} \text{ or } \frac{8}{10} \text{ or } \frac{12}{15} \text{ or } \frac{16}{20} \text{ or } ...$$	3
	The possible combinations are $4Y + 1G, 8Y + 2G, 12Y + 3G, 16Y + 4G$	
	Since there were initially 12 socks and 4 G socks, the smallest valid case is	
	$16Y + 4G \Rightarrow 8$ new socks have been added.	

Question 34		
(a)		2
(b)	$y = 2.957x - 13.997$ (from calculator) $S = 2.957T - 13.997$	2
c)	Strong, positive	2

Question 35		
(a)	$\text{Area1} \approx \frac{0.65}{2}(0.75 + 0.9) \approx 0.53625 \text{ km}^2$ $\text{Area2} \approx \frac{0.65}{2}(0.9 + 1.25) \approx 0.69875 \text{ km}^2$ Total Area $\approx 0.52 + 0.69875 \approx 1.235 \text{ km}^2$	2
(b)	$1.235 \times 1000^2 = 1235000 \text{ m}^2$ Rates $= 1235000 \times 0.125 \text{ c} = 154375 \text{ c} = \$1543.75$	2

Question 36		
(a)	Many possible answers e.g. length 14m, width 10m	1
(b)	$A = lw$ $= l(l\text{-}4)$	1
c)	A length of 0 to 4 metres would give a width of -4 to 0 metres which is impossible	1
d)	From the graph – Area 117 m2 gives length of 13m. Dimensions are 13m x 9m	1

Question 37		
(a)	$\text{Cost of running bar fridge} = 352 \times \$0.24637$ $= \$86.72$ $\text{Total cost for 3 years} = \$86.72 \times 3 + \$560$ $= \$820.17$	2
(b)	$\text{Percentage increase} = \frac{352}{682} \times 100$ $= 51.6129....$ $= 52\%$	1

Question 38		
	$$N = \frac{k}{A}$$ $$1600 = \frac{k}{0.5}$$ $$k = 1600 \times 0.5$$ $$k = 800$$ $$N = \frac{800}{4}$$ $$N = 200$$ $\therefore$ venue would hold (1600-200) = 1400 less people	3
	Provides correct solution	3
	Finds correct number of people during COVID restrictions	2
	Attempts to calculate k using inverse variation or equivalent	1

Question 39		
(a)	8 (A-B-D-F-G-I-K-L)	1
(b)	12 weeks	1
c)	J (5 weeks) Students should note that if they didn't leave the answer as J, but further engaged with the question and stated an incorrect float time they could not be awarded marks.	1
(d)	29 weeks (reduce D by 2 and C by 1, saving 2 weeks. Also reduce G by 2, H by 1 and K by 2 saving 4 weeks. Total saving is 6 weeks. 35-6 = 29)	1
(e)	The answer is as follows. 0 1 2 1 1 A method mark was available for one of the following answers that also reduced the overall time by four weeks and did not involve unnecessary wastage. 	2