

Student's Name: _____

Teacher's Code: _____



Saint Ignatius' College, Riverview
Mathematics Assessment Task
2025

Year 12
Mathematics Standard 2
HSC Trial Assessment Task
Date: Wednesday 27th August 2025

General Instructions

- **Reading time: 10 minutes**
- **Time Allowed: 2 hours 30 minutes**
- Write using black or blue pen.
- Calculators approved by NESA may be used.
- A NESA reference sheet is provided.
- Attempt all questions in the space provided on the paper.
- Write **your name** and **your teacher's code** in the positions indicated.
- Marks may not be awarded for missing or carelessly arranged working.
- **Diagrams are not drawn to scale.**

Teachers:

- Mr C Wright CDW
- Mrs N Collaros NGC
- Mr J Newey/ JPN
Mrs K Mullan
- Mrs F Yates FEY
- Mr J Myles JMM
- Mr G Abrahams/ GJA
Dr M Furtado

Section 1	15 Marks
Multiple Choice	
Section 2	17 Marks
Extended Response	
Section 3	15 Marks
Extended Response	
Section 4	14 Marks
Extended Response	
Section 5	13 Marks
Extended Response	
Section 6	15 Marks
Extended Response	
Section 7	11 Marks
Extended Response	
Total	100 Marks

Year 12 Mathematics Standard 2 – Multiple Choice Answer Sheet

Select the alternative A, B, C or D that best answers the question.

Fill in the response oval completely.



Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9
 A ☐ B ☒ C ☐ D ☐

- If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ☒ B ☒ C ☐ D ☐

- If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word correct and drawing an arrow as follows.

A ☒ B ☒ C ☐ D ☐
 correct
 ↙

- | | | | | | | | | |
|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 2. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 3. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 4. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 5. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 6. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 7. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 8. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 9. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 10. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 11. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 12. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 13. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 14. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |
| 15. | A | ☐ | B | ☐ | C | ☐ | D | ☐ |

Section 1 (15 Marks)

Questions 1 – 15 are multiple choice

Select the best response and shade your answer on the corresponding answer sheet provided.

Question 1

An amount of \$5000 is invested at a simple interest of 3% per annum.

How much interest is earned in the first five years?

- A. \$75
- B. \$750
- C. \$5750
- D. \$575

Question 2

A basketball court is measured to be 28.65 metres long.

What is the absolute error of the length of the basketball court?

- A. 1 *cm*
- B. 0.1 *cm*
- C. 5 *cm*
- D. 0.5 *cm*

Question 3

A bike was purchased for \$990, including 10% GST.

What is the amount of GST included in the price?

- A. \$9
- B. \$90
- C. \$9.90
- D. \$99

Question 4

City A is at latitude 54°S and longitude 121°W . City B is 24° north of and 17° east of City A.

What are the latitude and longitude of City B?

- A. 78°S , 104°E
- B. 78°S , 104°W
- C. 30°S , 104°E
- D. 30°S , 104°W

Question 5

Amanda received her natural gas account.

She is charged 4.182 cents per MJ for the first 6000 MJ and 2.315 cents per MJ for any further usage.

What is the cost if she used 9350 MJ of natural gas?

- A. \$607.47
- B. \$328.47
- C. \$216.45
- D. \$391.02

Question 6

Which is the correct expression to make t the subject of the formula:

$$x = at^2 - yz$$

- A. $\pm \sqrt{\frac{yz+x}{a}}$
- B. $\sqrt{\frac{yz+x}{a}}$
- C. $\pm \sqrt{\frac{x-yz}{a}}$
- D. $\sqrt{\frac{a}{yz+x}}$

Question 7

Which of the following expressions would give the height of the tree in the diagram?



A. $38 \times \cos 51^\circ$

B. $\frac{38}{\tan 51^\circ}$

C. $38 \times \tan 51^\circ$

D. $\frac{38}{\cos 51^\circ}$

Question 8

A group of students sat an exam for Mathematics and an exam for English. The students' scores are given in the table below.

Identify the equation of the least-squares regression line for the scores.

Student	A	B	C	D	E	F	G
Maths (x)	72	70	54	52	87	61	72
English (y)	80	84	62	71	93	75	82

A. $y = -22.36x + 1.14$

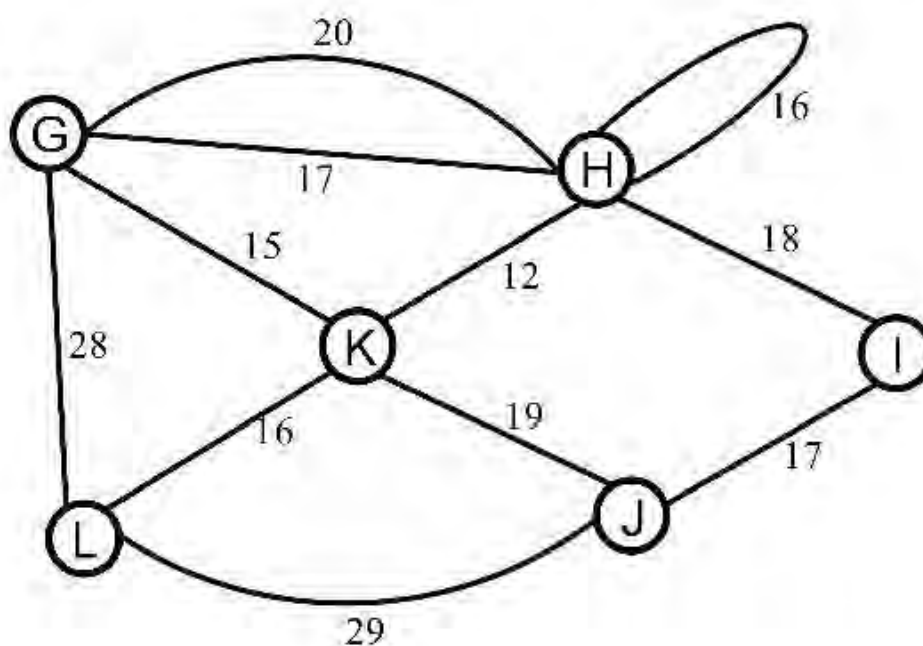
B. $y = 1.14x - 22.36$

C. $y = 27.06x + 0.76$

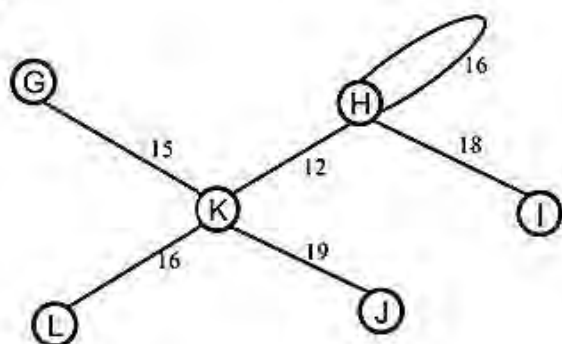
D. $y = 0.76x + 27.06$

Question 9

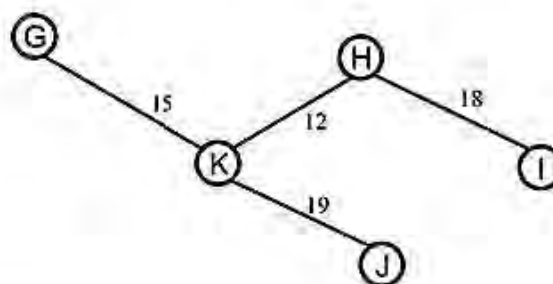
Which diagram shows a spanning tree for the network below?



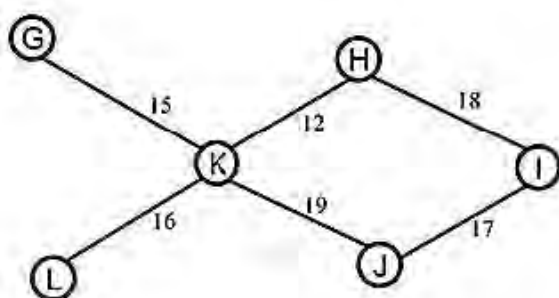
A.



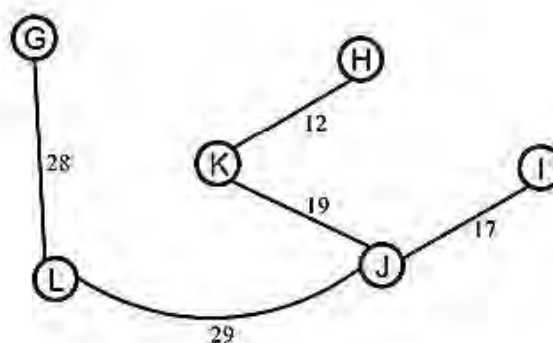
B.



C.



D.



Question 10

The following formula can be used to calculate an estimate for blood alcohol content (BAC) for males.

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

N is the number of standard drinks consumer

M is the person's weight in kilograms

H is the number of hours of drinking

Matthew weighs 85 kg. His BAC was zero when he began drinking alcohol. At 11:00 pm, after consuming 4.5 standard drinks, his BAC was 0.028.

Using the formula, estimate at what time Matthew began drinking alcohol, to the nearest minute.

- A. 7.15 pm
- B. 7.09 pm
- C. 6.45 pm
- D. 7.30 pm

Question 11

Joe was studying the population of fur seals in the Galapagos Islands in 2023.

He caught and marked 75 seals and released them back into the waters. A month later, 200 seals were caught at random and 30 of these 200 seals had been tagged.

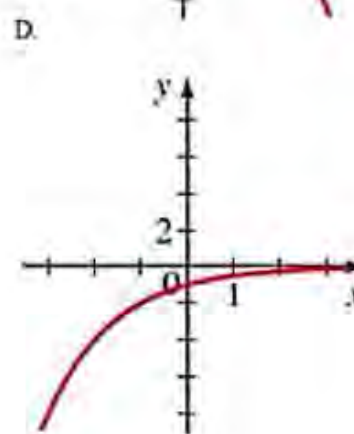
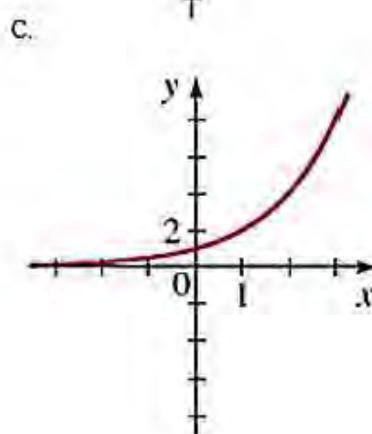
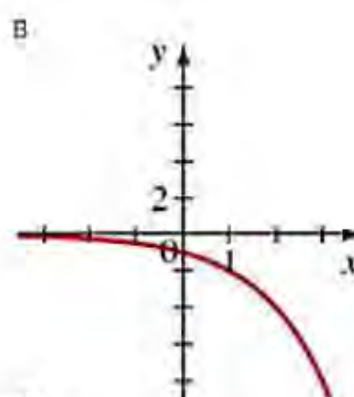
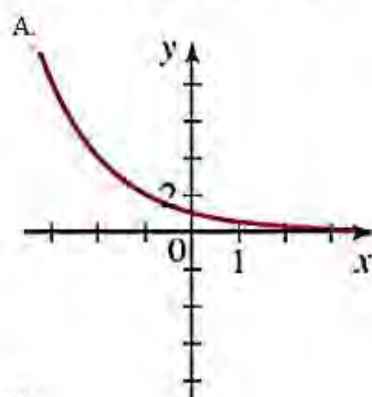
The estimated population of seals in 2023 was 12% less than the estimated population for 2020.

What was the estimated population for 2020?

- A. 440
- B. 560
- C. 500
- D. 512

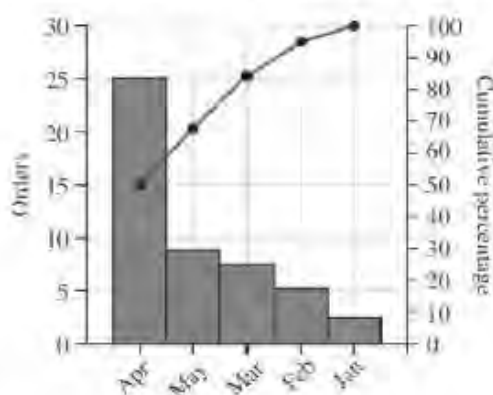
Question 12

Which of the following graphs represents $y = -2^x$?



Question 13

The Pareto chart below shows the orders received by a business for five months.



What percentage of orders were received in May?

- A. 66%
- B. 18%
- C. 30%
- D. 45%

Question 14

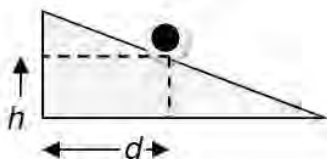
A group of 120 workers took a competency test in welding and their results were normally distributed. The mean score of the group was 70% with a standard deviation of 4%.

Lisa scored 80% on the test. What is this as a z-score?

- A. -2.5
- B. -1
- C. 1
- D. 2.5

Question 15

A ball is rolling down a ramp, as shown in the diagram below.



The ball's height is modelled by the equation:

$$h = -0.4d^2 + 10$$

h is the height of the ball, in metres, and

d is the horizontal distance from the start of the ramp, in metres.

Find the horizontal distance travelled by the time the ball reaches the floor.

- A. 5 m
- B. 10 m
- C. 15 m
- D. 30 m

END OF SECTION 1

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Section 2 (17 Marks)

Question 16 (3 marks)

David, Ethan, and Felix are the top three swimmers in the school swim team.

In a recent swimming carnival, David swam 1200 m, Ethan swam 900 m, and Felix swam 1500 m.

- a) What is the ratio of David's to Ethan's to Felix's distances, in simplest form?
- 1

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- b) In the carnival, the ratio of the total distance swum by David, Ethan, and Felix to the total distance swum by the whole swim team is 9:20.
- 2

How many metres did the whole team swim?

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Question 17 (2 marks)

Solve the equation:

$7p - 13 = 4(p + 5)$

2

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Question 18 (2 marks)

A rare collectible card is increasing in value by 4.1% each day due to rising demand.

If the card is currently worth \$2.50, by how much will its value **increase** in 90 days if the trend continues? Round your answer to the nearest cent. **2**

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Question 19 (3 marks)

Sophia is driving her car at 80 km/h on dry road. Her braking distance (D metres) is given by the formula:

$$D = 0.01 v^2$$

Where v is speed, measured in km/h.

- a) Calculate her braking distance while travelling at this speed. **1**

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- b) While travelling at 80 km/h, she notices a branch on the road 90 metres ahead and decides to apply the brakes. Her reaction time is 2.3 seconds. **2**

By first calculating Sophia’s reaction distance, determine whether she will be able to stop in time before she hits the branch.

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Question 20 (4 marks)

The stem and leaf plot below displays the distribution of pulse rates, measured in beats per minute, of 20 students before and after exercise.

Before Exercise	Pulse Rate	After Exercise
9 8 7 7	6	
9 7 6 5 3 3 2 0	7	
5 3 2 2 1	8	0 1 1 4 6 7 7 9
0	9	2 3 6 8 9
3	10	0 3 9
1	11	3 4
	12	0
	13	
	14	4

- a) Comment on the skewness of the distribution for **before** exercise. 1

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- b) Find the median of the pulse rates of the students **after** exercise. 1

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- c) After exercise, one of the students had a heart rate of 144 beats per minute. 2

Is this student's measurement an outlier for this data set? Justify your answer with calculations.

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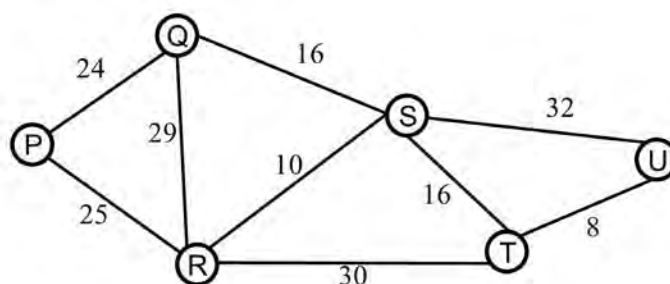
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Question 21 (2 marks)

Rafael drives from his home at Paradis (P) to his work at Utopia (U).

There are several roads that he can use that pass through four other towns Quark, Raptor, Supernova and Titan. The travel times (in minutes) between each of the towns is shown on the network diagram below.



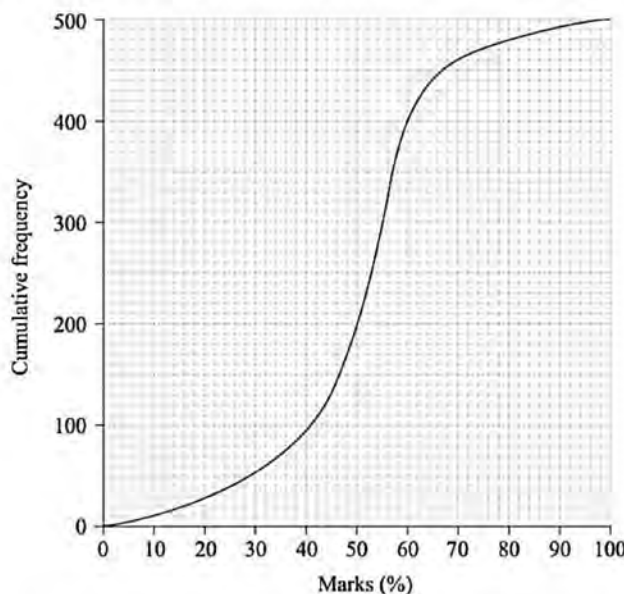
What is the least time he can take to get to work and through which towns would he travel to achieve this? 2

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Question 22 (1 mark)

The cumulative frequency curve below displays the percentage marks attained by 500 students in an examination.



Steve was one of the students who sat the examination. 80% of the students scored less than Steve.

What mark did Steve get?

1

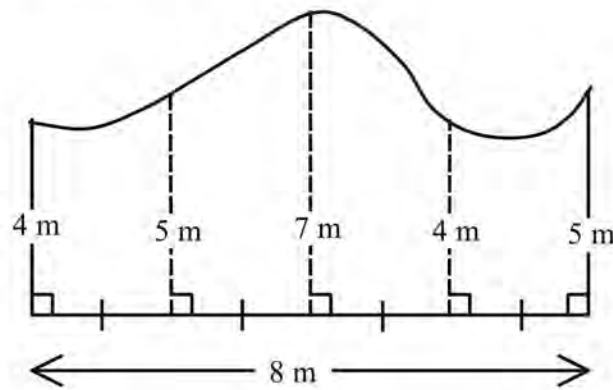
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END OF SECTION 2

Section 3 (15 Marks)**Question 23** (3 marks)

The diagram below shows a bird's eye view of a swimming pool. The pool has three straight sides and one which is curved. The entire pool has the same depth.



Maria takes the measurements shown of the pool in preparation for filling it with water.

- a) Use the trapezoidal rule with **two** applications to estimate the area of the base of the pool.

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- b) When the pool is full, it holds 345 000 litres of water.

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Using the fact that 1 m^3 holds 1000 litres of water, calculate how deep the pool is.

Write your answer in metres, to 1 decimal place.

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Question 24 (2 marks)

The results of the last 400 court cases and what the defendant pleaded are recorded in the following table.

Verdict	Defendants initial plea		
	Guilty	Not Guilty	Total
Guilty	120	34	154
Not Guilty	10	236	246
Total	130	270	400

- a) What is the probability that a person chosen at random had a verdict of **not** guilty? 1

Write your answer as a simplified fraction.

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- b) What percentage of the defendants who pleaded 'Not Guilty' were actually found to be guilty? 1

Write your answer to 1 decimal place.

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Question 25 (4 marks)

George purchased 500 shares at \$43.85 each. Brokerage fees were 2.4% of the total purchase price.

A few months later, George is paid a dividend of \$511.

- a) Calculate the total cost of purchasing the shares.

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- b) Calculate the dividend yield, correct to 2 decimal places.

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Question 26 (3 marks)

Lilah has a reducing balance personal loan. Her monthly repayment (R) is \$560. The payment schedule for the first month has been filled in the table below.

n	Principal (P)	Interest (I)	$P + I$	$P + I - R$
1	20000	175	20175	19615
2	19615			

- a) What is the monthly rate of reducible interest charged on the loan? Write your answer as a percentage.

1

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- b) Complete the table for the second month of the loan.

2

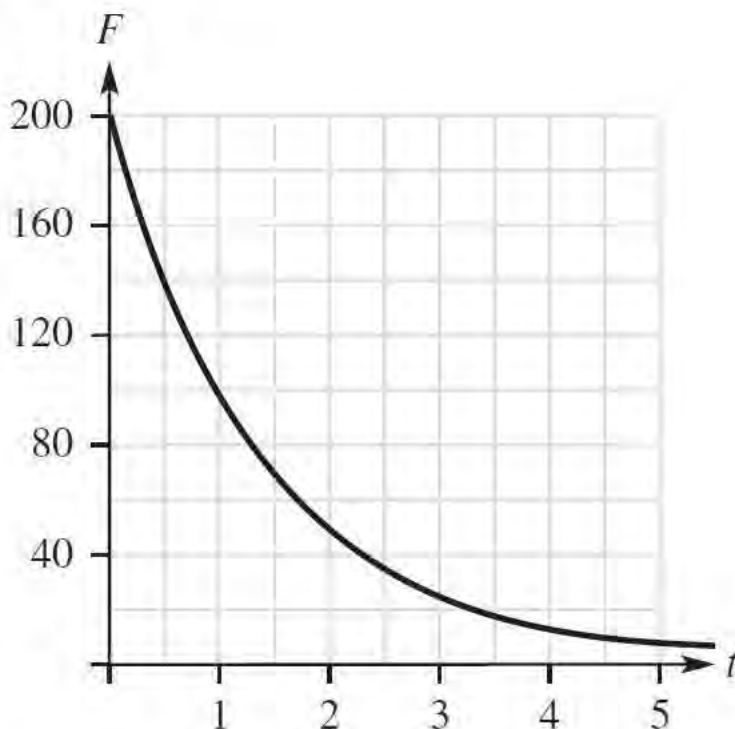
Question 27 (3 marks)

The size of a flock of birds, F , after t years is decaying exponentially using the function:

$$F = A \times (0.5)^t$$

Where A is a constant.

The graph of the equation is shown below.



- a) In the equation for the graph above, the value of A is 200. What does A represent? 1

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- b) Use **the equation** to calculate how many birds were present after 3 years. 1

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- c) What is the yearly decay rate of the size of the flock of birds? Write your answer as a percentage. 1

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END OF SECTION 3

Section 4 (14 Marks)**Question 28** (2 marks)

James boards a plane in London at 11 pm on Thursday 12th September and flies for 22 hours before arriving in Sydney. 2

Given that Sydney's time zone is nine hours ahead of London's, what is the local time, day and date when he arrived in Sydney?

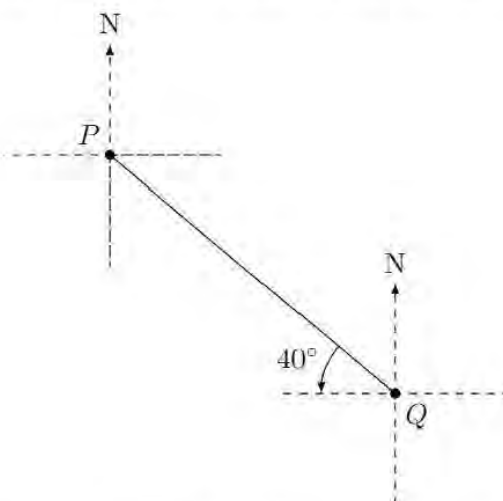
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Question 29 (3 marks)

A plane flies 425 km from P to Q, as shown below. The plane then flies on a bearing of $030^\circ T$ until it is due East of P. This is point M. Then it flies directly West back to P.



- a) Finish the flight of the plane and label the above information on the diagram given. **You must show point M and the distance of 425 km.** 1
- b) Find the distance QM . Write your answer to the nearest km. 2

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Question 30 (3 marks)

Edward and Emily are enrolled in different schools but are doing the same courses in English and Mathematics. When they complete their Trial HSC Exams, they compare their results in Mathematics and English from their separate schools.

Student	English Result	Mathematics Result
Edward (ABC College)	84	Forgotten
Emily (DEF High School)	89	79

The statistical results for the exams at both schools are shown below. All the exam results were normally distributed.

School	English Mean	English Standard Deviation	Mathematics Mean	Mathematics Standard Deviation
ABC College	68	8	62	8
DEF High School	74	6	64	5

- a) Use z-scores to determine which student performed better on their English exam compared to their school cohort.

2
- b) Edward did not remember his maths mark but did remember being told he had a z-score of +2.5 on the Mathematics exam.

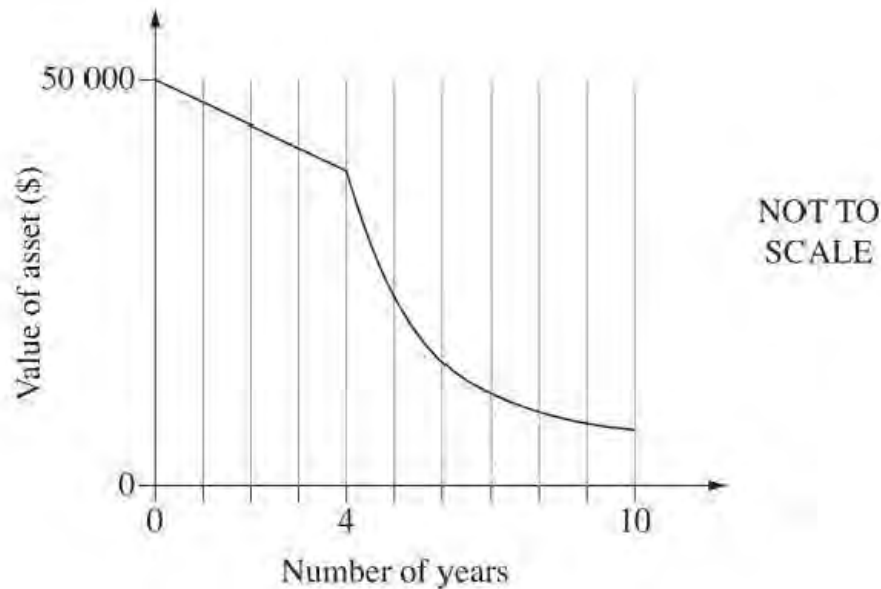
1

Calculate Edward’s raw maths mark.

Question 31 (2 marks)

The graph below shows the decreasing value of a car.

Over the first four years, the value of the car depreciates using a straight-line method of depreciation. After the end of the fourth year, the method of depreciation changed to the declining balance method at a rate of 28% per annum.



- a) By the end of the fourth year, the car's value was \$38 000. What is the rate of depreciation, per year, over the first four years? 1

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- b) What is the value of the car at the end of the 10 years? Round your answer to the nearest cent. 1

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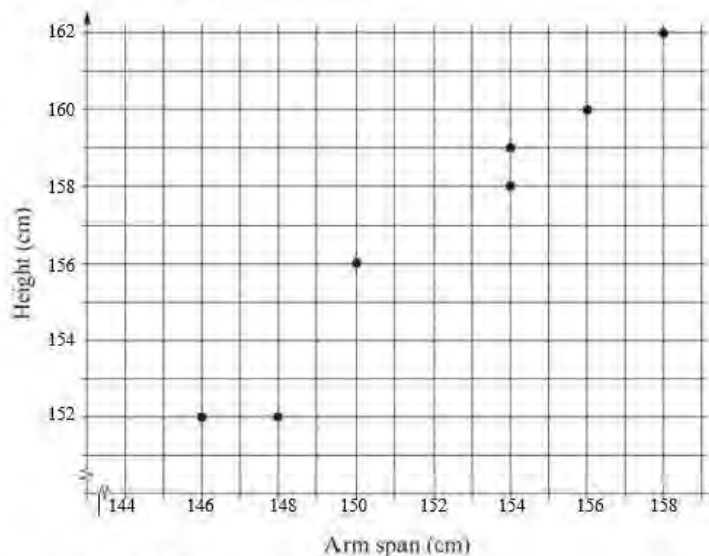
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Question 32 (4 marks)

A set of bivariate data is collected by measuring the height and arm span of Year 7 students. The graph shows a scatterplot of these measurements.



- a) Calculate the Pearson's correlation coefficient for the data, correct to 2 decimal places. 1

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- b) Identify the direction and strength of the association between height and arm span. 1

Circle the most appropriate answer.

- A. No association
- B. Strong positive
- C. Weak negative
- D. Strong negative

- c) The equation of the least-squares regression line is:

$$\text{Height} = B \times \text{arm span} + 25.07$$

- i. Use your calculator to find the value of B , correct to three decimal places. 1

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- ii. If a student is 173 cm tall, calculate their predicted arm-span using the equation of the least-squares regression line. Write your answer to 1 decimal place. 1

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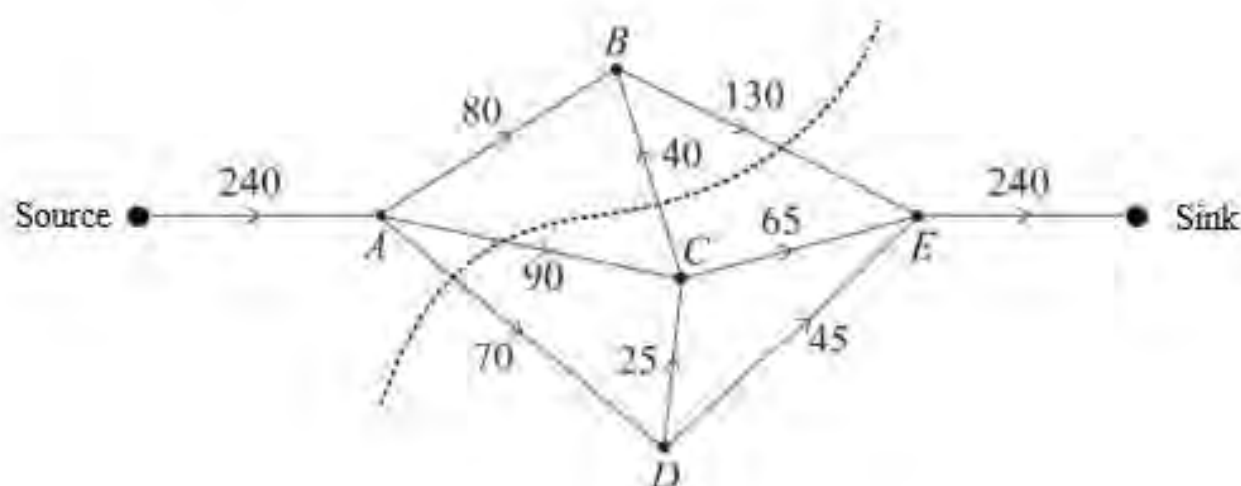
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END OF SECTION 4

Section 5 (13 Marks)**Question 33 (3 marks)**

The network diagram below shows the maximum flow rate through a series of pipes in litres per minute.



- a) What is the capacity of the cut shown?

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- b) Determine the maximum flow of this network.

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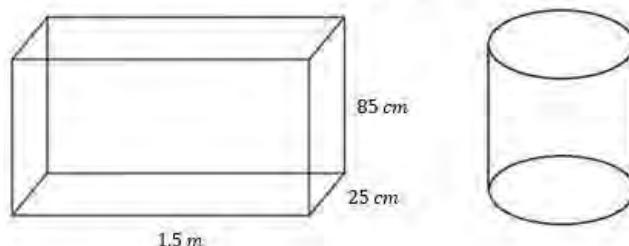
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Question 34 (3 marks)

A block of glass in the shape of a rectangular prism is 1.5 m by 25 cm by 85 cm is melted down and poured into a cylindrical mould that is of the same height as the rectangular prism.



- a) Find the volume of the block of glass in cubic centimetres.

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- b) If the cylinder can be filled exactly to the brim, what would the radius of the cylinder be? Write your answer in centimetres, to 2 decimal places.

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Question 35 (2 marks)

A factory produces metal cylindrical cans.

The cylinders which come off the production line have diameters which are normally distributed with a mean of 7.8 cm and a standard deviation of 0.05 cm. Any cylinder with a diameter greater than 7.85 cm or less than 7.70 cm must be rejected.

If 1800 cans are produced, how many of them are expected to be rejected?

2

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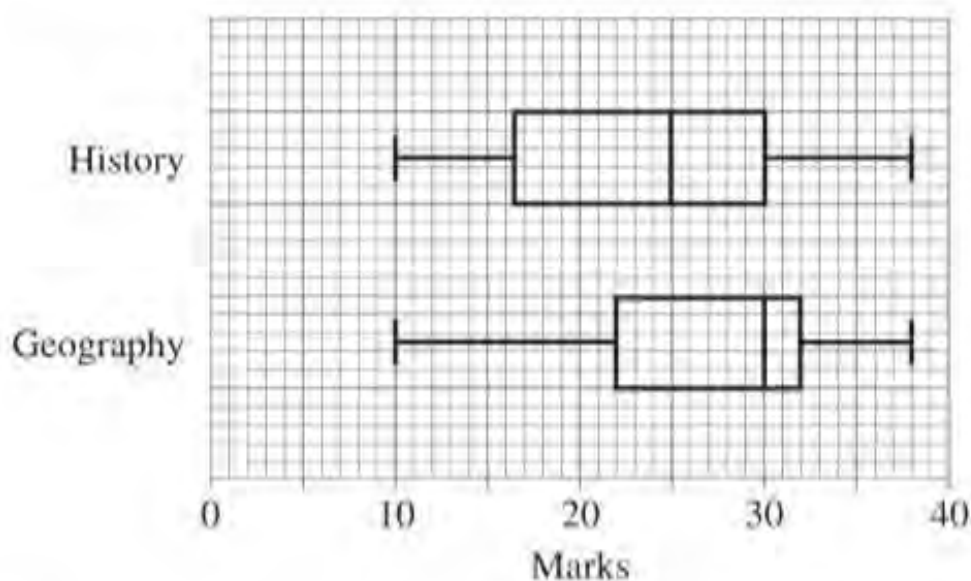
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Question 36 (2 marks)

The box-and-whisker plots show the results of a History test and a Geography test.



112 students completed the History test. The number of students who scored above 30 marks was the same for the History test and the Geography test.

Calculate the number of students who completed the Geography test.

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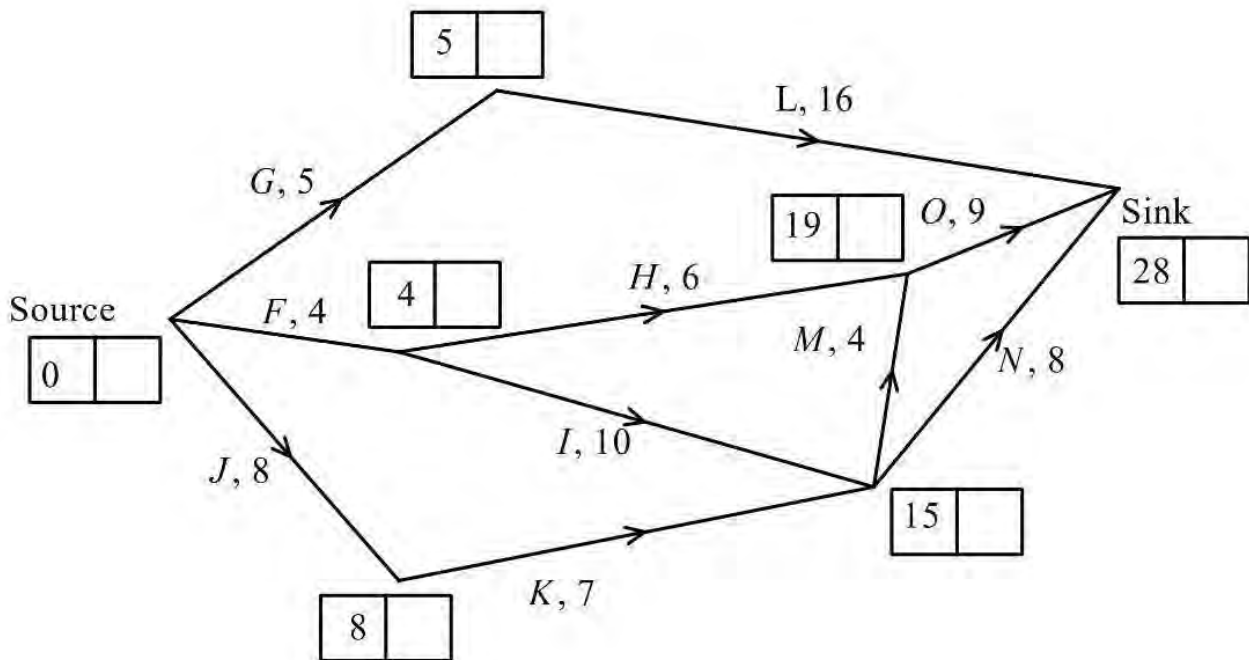
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Question 37 (3 marks)

The network diagram shows the time needed, in hours, to complete the tasks required for a bathroom renovation project.



A forward scan has been completed for the project and the earliest start times are shown on each vertex.

- Complete a backward scan and write the latest finish times in the spaces on each vertex. 2
- List the critical path for the project 1

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END OF SECTION 5

Section 6 (15 Marks)**Question 38 (4 marks)**

Jasmine is looking to buy a small café business. The lender has provided her with a table of monthly repayments for a \$1000 loan at various interest rates and loan terms.

<i>Interest rate per annum</i>	<i>Term of loan in years</i>					
	<i>5</i>	<i>10</i>	<i>15</i>	<i>20</i>	<i>25</i>	<i>30</i>
6.0%	19.33	11.10	8.44	7.16	6.44	6.00
6.5%	19.57	11.35	8.71	7.46	6.75	6.32
7.0%	19.80	11.61	8.99	7.75	7.07	6.65
7.5%	20.04	11.87	9.27	8.06	7.39	6.99
8.0%	20.28	12.13	9.56	8.36	7.72	7.34

Jasmine has saved \$90,000 to help with the purchase of a \$360,000 café business.

- a) Jasmine decides to use \$40,000 of her savings as a deposit and borrow the remainder over 20 years at 6.5% p.a. Calculate her monthly loan repayment. 2

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- b) After further discussions, Jasmine realises her maximum monthly repayment capacity is \$1500. The lender agrees to a 6.0% interest rate over 30 years if Jasmine uses her full savings as a deposit. The seller also agrees to drop the asking price by \$10,000. Based on this, can Jasmine afford the café? 2

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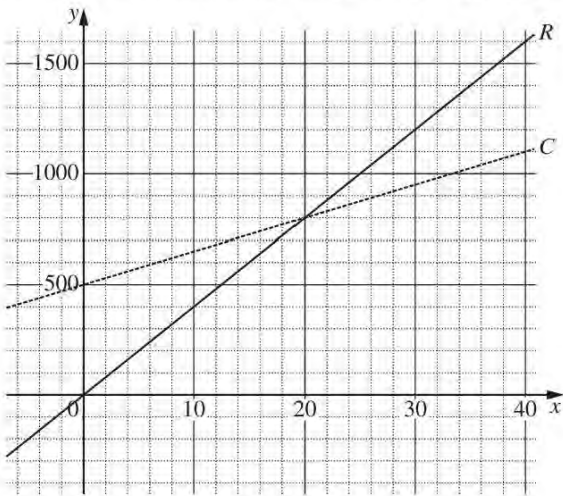
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Question 39 (5 marks)

A business makes and sells T-shirts.

The graph below shows the cost of making the T-shirts (C) and the revenue from selling the T-shirts (R). The x -axis displays the number of T-shirts and the y -axis displays the cost/revenue in dollars.



- a) How many T-shirts need to be sold to break even? 1

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- b) i. Form an equation for the cost (C) of making the T-shirts (x). 1

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- ii. Form an equation for the revenue (R) from selling the T-shirts (x) 1

.....

.....

- iii. Using your equations from part (i) and (ii), determine how many T-shirts need to be sold to earn a **profit** of \$1800. 1

.....

.....

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Question 39 continues on the next page

- c) Approximate the number of T-shirts that need to be sold to break even if the total cost increases by 15%. 1

Write your answer to the nearest whole number.

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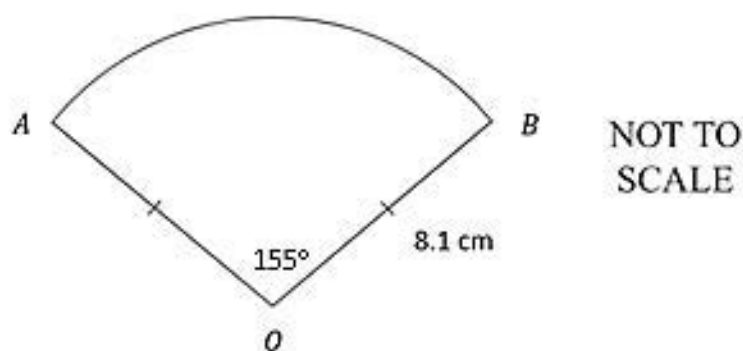
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Question 40 (2 marks)

The sector AOB has an angle of 155° and is part of a circle with radius 8.1 cm.



Calculate the perimeter of sector AOB , correct to two decimal places.

2

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Question 41 (4 marks)

The table below shows the Australian tax rates for the 2024 – 2025 financial year.

Taxable income	Tax on this income
0 - \$18 200	Nil
\$18 201 - \$37 000	19c for each \$1 over \$18 200
\$37 001 - \$90 000	\$3 572 plus 32.5c for each \$1 over \$37 000
\$90 001 - \$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

Kanan is a teacher who earns an annual salary of \$118 500 and an additional \$5400 per year from private tutoring. He is allowed various deductions, including \$280 on textbooks, \$190 on stationery, and **monthly** union fees of \$87.

- a) Calculate Kanan's taxable income. 1

.....

.....

- b) Calculate Kanan's income tax payable. 1

.....

.....

.....

- c) Kanan was required to pay 1.25% of his taxable income as a Medicare levy. Calculate the Medicare levy on Kanan's taxable income. 1

.....

- d) Kanan has already paid \$26 000 in PAYG tax instalments throughout the year. 1

Calculate the total amount Kanan still owes after accounting for his PAYG tax instalments, income tax payable, and Medicare levy.

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END OF SECTION 6

Section 7 (11 Marks)**Question 42 (2 marks)**

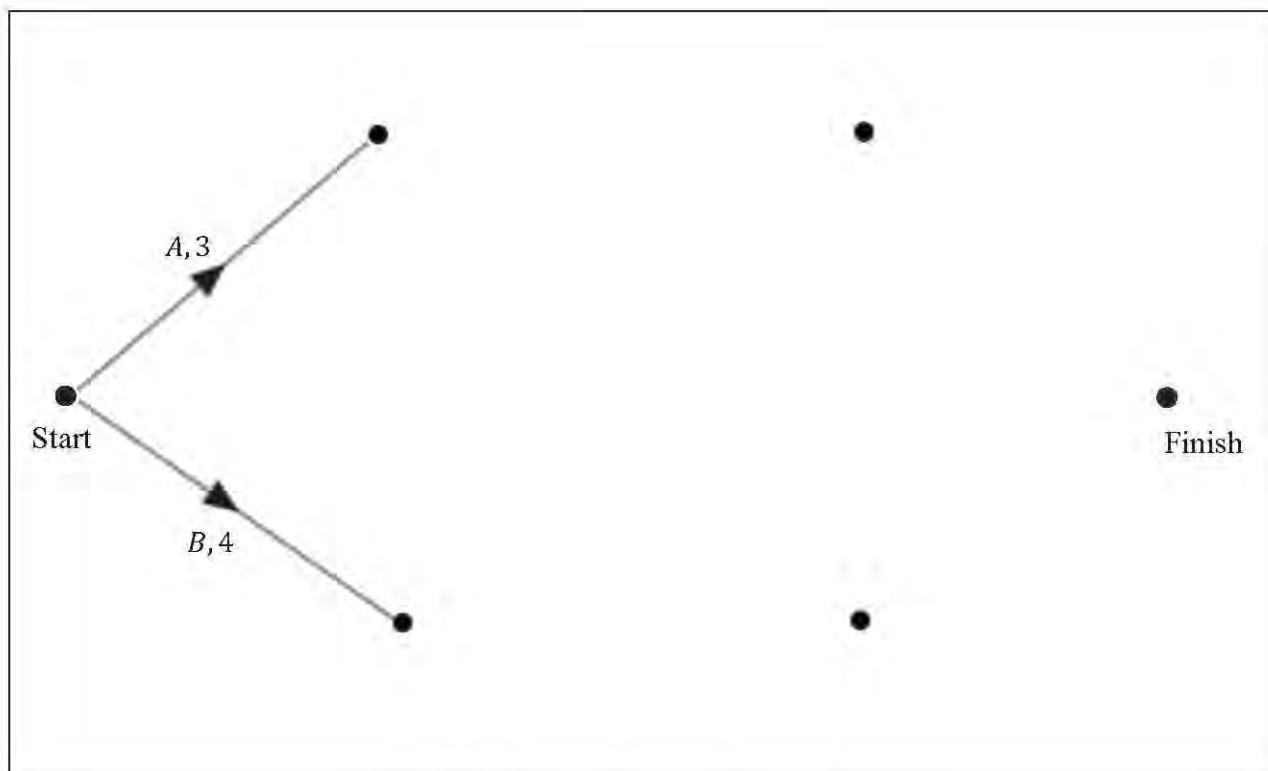
The activity chart below shows the immediate prerequisites and required hours for each activity to be completed in a project.

<i>Activity</i>	<i>Immediate prerequisite(s)</i>	<i>Duration (in hours)</i>
<i>A</i>	—	3
<i>B</i>	—	4
<i>C</i>	<i>B</i>	5
<i>D</i>	<i>A, C</i>	4
<i>E</i>	<i>B</i>	6
<i>F</i>	<i>B</i>	2
<i>G</i>	<i>F</i>	2
<i>H</i>	<i>D, E</i>	3

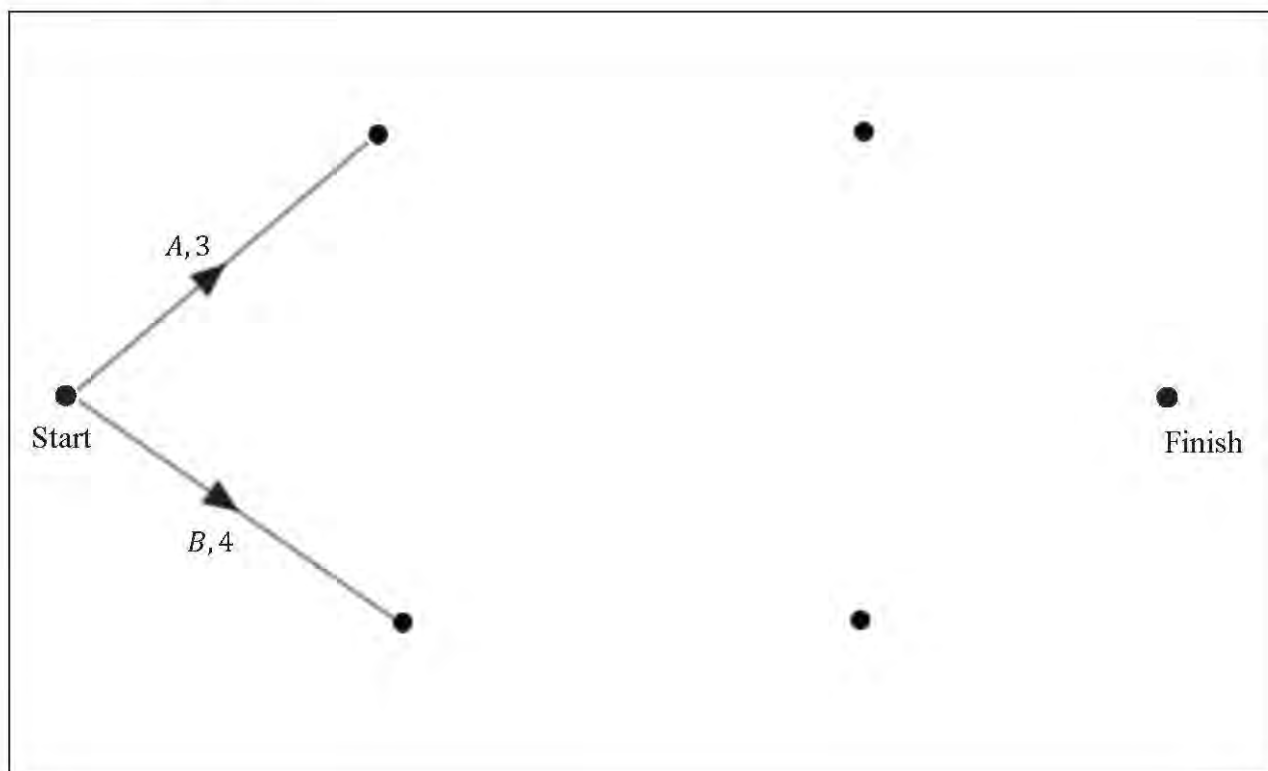
- a) Complete the rest of the network diagram for this project.

You may use the space below to practise.

Draft diagram (*not marked*)

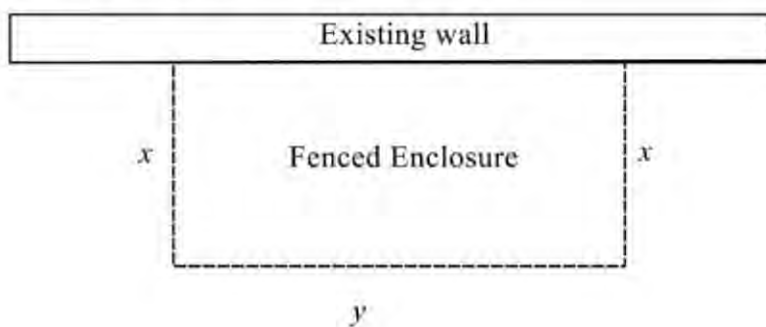


Question 42 continues on the next page

**Question 43** (5 marks)

Sarah plans to build a rectangular enclosure for her new chickens against an existing wall, using 16 metres of wire fencing as shown below.

The enclosure has width x and length y .



- a) Sarah reasons that $y = 16 - 2x$.

1

Given that the area of a rectangle is given by $A = \text{length} \times \text{width}$, show that the area of the enclosure can be written as $A = 16x - 2x^2$.

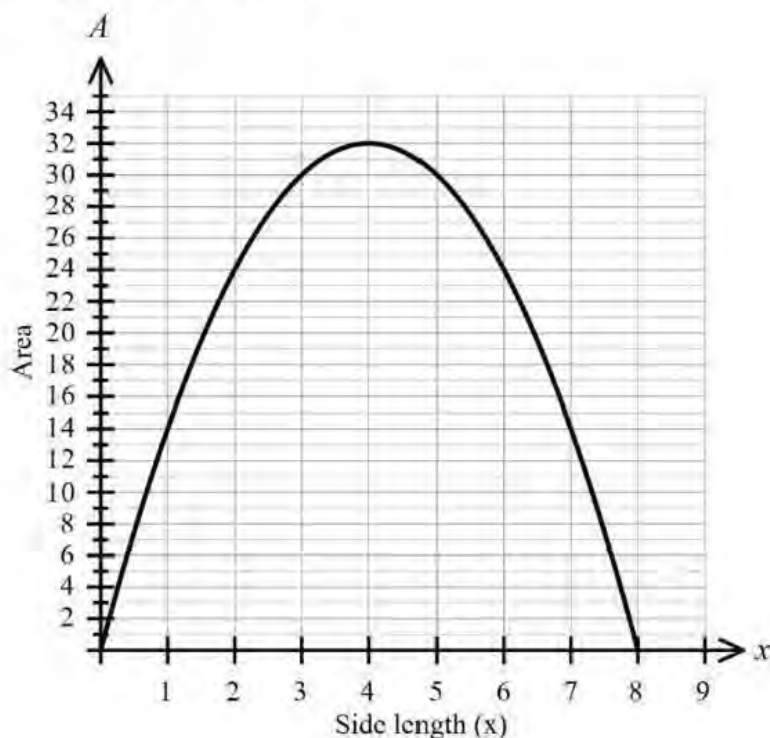
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Question 43 continues on the next page

The graph of $A = 16x - 2x^2$ is shown below.



- b) Use **the graph** to determine the two values of x which would give the enclosure an area of 24 m^2 and then give the dimensions (i.e., length and width) of the enclosure in each case. 2

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- c) Calculate the perimeter of the fenced enclosure (excluding the existing wall) when the maximum possible area is achieved. 2

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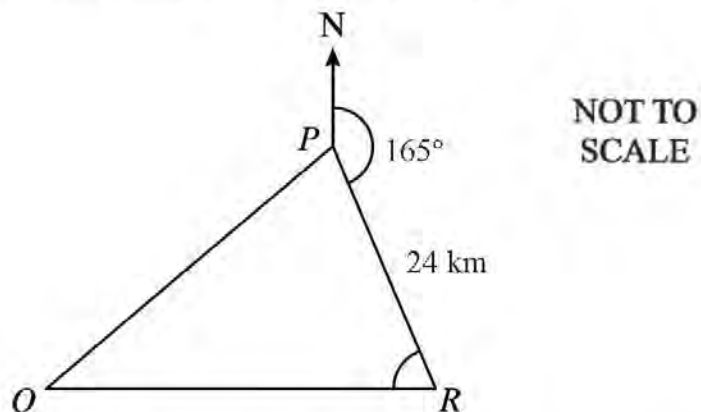
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Question 44 (4 marks)

A fishing boat leaves a harbour at P and travels on a bearing of 165° for 24 km to a fishing spot at R .

From R , the boat travels due west to another fishing spot at Q .

The final part of the boat's journey is on a bearing of 43° from Q back to P .



Calculate the total distance travelled by the fishing boat, in kilometres, correct to three significant figures.

4

END OF SECTION 7

END OF PAPER

Student's Name: _____

Teacher's Code: _____



Saint Ignatius' College, Riverview
Mathematics Assessment Task
2025

Year 12
Mathematics Standard 2
HSC Trial Assessment Task
Date: Wednesday 27th August 2025

General Instructions

- **Reading time: 10 minutes**
- **Time Allowed: 2 hours 30 minutes**
- Write using black or blue pen.
- Calculators approved by NESA may be used.
- A NESA reference sheet is provided.
- Attempt all questions in the space provided on the paper.
- Write **your name** and **your teacher's code** in the positions indicated.
- Marks may not be awarded for missing or carelessly arranged working.
- **Diagrams are not drawn to scale.**

Teachers:

- Mr C Wright CDW
- Mrs N Collaros NGC
- Mr J Newey/ JPN
Mrs K Mullan
- Mrs F Yates FEY
- Mr J Myles JMM
- Mr G Abrahams/ GJA
Dr M Furtado

Section 1	15 Marks
Multiple Choice	
Section 2	17 Marks
Extended Response	
Section 3	15 Marks
Extended Response	
Section 4	14 Marks
Extended Response	
Section 5	13 Marks
Extended Response	
Section 6	15 Marks
Extended Response	
Section 7	11 Marks
Extended Response	
Total	100 Marks

Student's Name: _____ Teacher's Name: _____

Year 12 Mathematics Standard 2 – Multiple Choice Answer Sheet

Select the alternative A, B, C or D that best answers the question.
Fill in the response oval completely.



Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9
A ☐ B ☒ C ☐ D ☐

- If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

▪

A ☒ B ☒ C ☐ D ☐

- If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word correct and drawing an arrow as follows.

A ☒ B ☒ C ☐ D ☐
correct

- | | | | | |
|-----|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1. | A ☐ | B ☒ | C ☐ | D ☐ |
| 2. | A ☐ | B ☐ | C ☐ | D ☒ |
| 3. | A ☐ | B ☒ | C ☐ | D ☐ |
| 4. | A ☐ | B ☐ | C ☐ | D ☒ |
| 5. | A ☐ | B ☒ | C ☐ | D ☐ |
| 6. | A ☒ | B ☐ | C ☐ | D ☐ |
| 7. | A ☐ | B ☐ | C ☒ | D ☐ |
| 8. | A ☐ | B ☐ | C ☐ | D ☒ |
| 9. | A ☐ | B ☐ | C ☐ | D ☒ |
| 10. | A ☐ | B ☒ | C ☐ | D ☐ |
| 11. | A ☐ | B ☒ | C ☐ | D ☐ |
| 12. | A ☐ | B ☒ | C ☐ | D ☐ |
| 13. | A ☐ | B ☒ | C ☐ | D ☐ |
| 14. | A ☐ | B ☐ | C ☐ | D ☒ |
| 15. | A ☒ | B ☐ | C ☐ | D ☐ |

Section 1 (15 Marks)

Questions 1 – 15 are multiple choice

Select the best response and shade your answer on the corresponding answer sheet provided.

Question 1

An amount of \$5000 is invested at a simple interest of 3% per annum.

How much interest is earned in the first five years?

- A. \$75
- B. \$750
- C. \$5750
- D. \$575

Question 2

A basketball court is measured to be 28.65 metres long.

What is the absolute error of the length of the basketball court?

- A. 1 cm
- B. 0.1 cm
- C. 5 cm
- D. 0.5 cm

Question 3

A bike was purchased for \$990, including 10% GST.

What is the amount of GST included in the price?

- A. \$9
- B. \$90
- C. \$9.90
- D. \$99

Question 4

City A is at latitude 54°S and longitude 121°W . City B is 24° north of and 17° east of City A.

What are the latitude and longitude of City B?

A. 78°S , 104°E

B. 78°S , 104°W

C. 30°S , 104°E

D. 30°S , 104°W

Question 5

Amanda received her natural gas account.

She is charged 4.182 cents per MJ for the first 6000 MJ and 2.315 cents per MJ for any further usage.

What is the cost if she used 9350 MJ of natural gas?

A. \$607.47

B. \$328.47

C. \$216.45

D. \$391.02

Question 6

Which is the correct expression to make t the subject of the formula:

$$x = at^2 - yz$$

A. $\pm \sqrt{\frac{yz+x}{a}}$

B. $\sqrt{\frac{yz+x}{a}}$

C. $\pm \sqrt{\frac{x-yz}{a}}$

D. $\sqrt{\frac{a}{yz+x}}$

Question 7

Which of the following expressions would give the height of the tree in the diagram?



A. $38 \times \cos 51^\circ$

B. $\frac{38}{\tan 51^\circ}$

C. $38 \times \tan 51^\circ$

D. $\frac{38}{\cos 51^\circ}$

Question 8

A group of students sat an exam for Mathematics and an exam for English. The students' scores are given in the table below.

Identify the equation of the least-squares regression line for the scores.

Student	A	B	C	D	E	F	G
Maths (x)	72	70	54	52	87	61	72
English (y)	80	84	62	71	93	75	82

A. $y = -22.36x + 1.14$

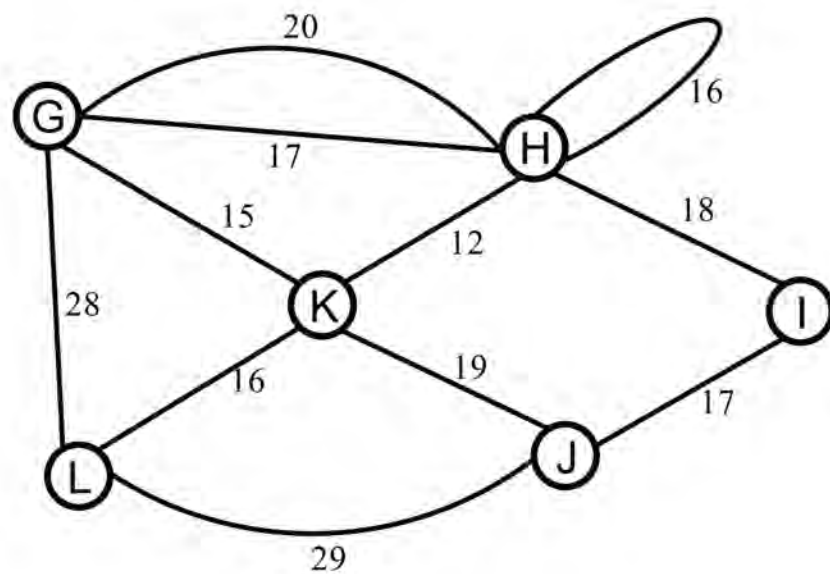
B. $y = 1.14x - 22.36$

C. $y = 27.06x + 0.76$

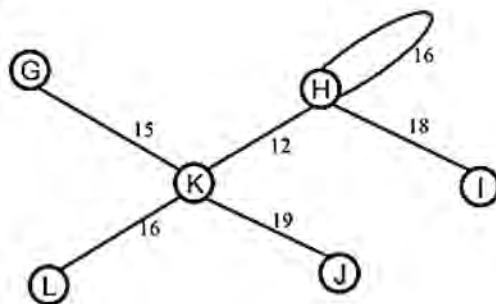
D. $y = 0.76x + 27.06$

Question 9

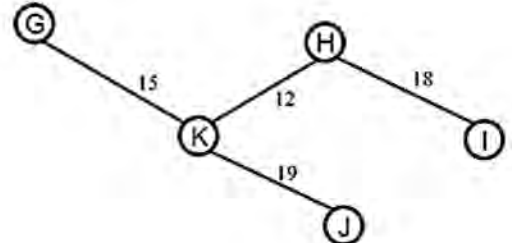
Which diagram shows a spanning tree for the network below?



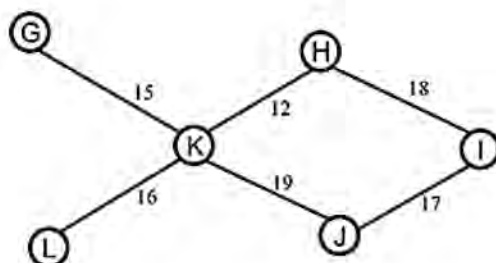
A.



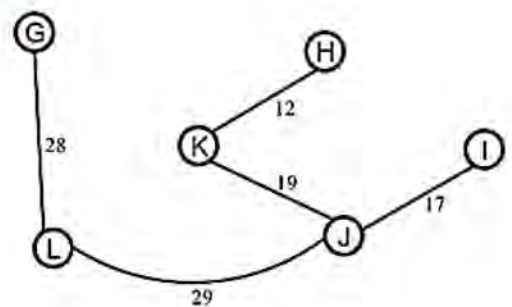
B.



C.



D.



Question 10

The following formula can be used to calculate an estimate for blood alcohol content (BAC) for males.

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

N is the number of standard drinks consumer

M is the person's weight in kilograms

H is the number of hours of drinking

Matthew weighs 85 kg. His BAC was zero when he began drinking alcohol. At 11:00 pm, after consuming 4.5 standard drinks, his BAC was 0.028.

Using the formula, estimate at what time Matthew began drinking alcohol, to the nearest minute.

- A. 7.15 pm
- B. 7.09 pm
- C. 6.45 pm
- D. 7.30 pm

Question 11

Joe was studying the population of fur seals in the Galapagos Islands in 2023.

He caught and marked 75 seals and released them back into the waters. A month later, 200 seals were caught at random and 30 of these 200 seals had been tagged.

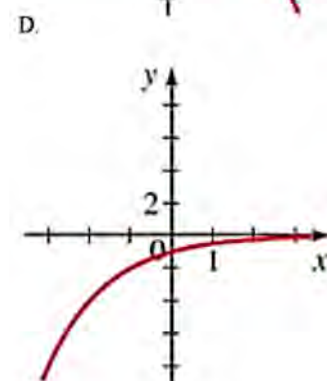
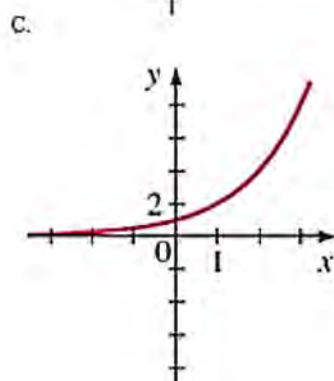
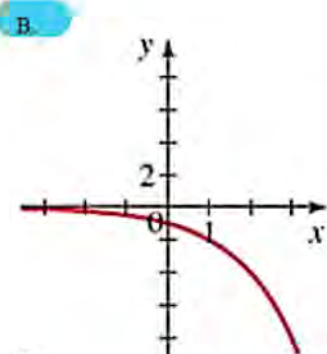
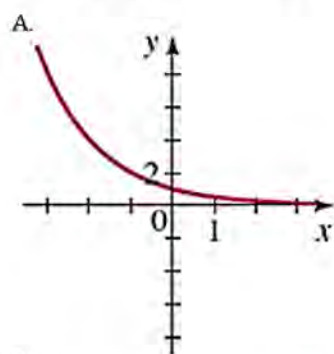
The estimated population of seals in 2023 was 12% less than the estimated population for 2020.

What was the estimated population for 2020?

- A. 440
- B. 560
- C. 500
- D. 512

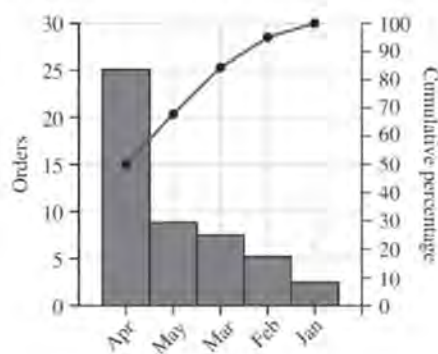
Question 12

Which of the following graphs represents $y = -2^x$?



Question 13

The Pareto chart below shows the orders received by a business for five months.



What percentage of orders were received in May?

A. 45%

B. 18%

C. 30%

D. 45%

Question 14

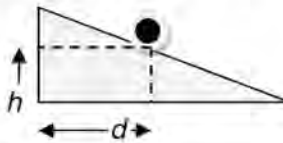
A group of 120 workers took a competency test in welding and their results were normally distributed. The mean score of the group was 70% with a standard deviation of 4%.

Lisa scored 80% on the test. What is this as a z-score?

- A. -2.5
- B. -1
- C. 1
- D. 2.5

Question 15

A ball is rolling down a ramp, as shown in the diagram below.



The ball's height is modelled by the equation:

$$h = -0.4d^2 + 10$$

h is the height of the ball, in metres, and
 d is the horizontal distance from the start of the ramp, in metres.

Find the horizontal distance travelled by the time the ball reaches the floor.

- A. 5 m
- B. 10 m
- C. 15 m
- D. 30 m

END OF SECTION 1

Student's Name: _____

Teacher's Code: _____

Section 2 (17 Marks)

Question 16 (3 marks)

David, Ethan, and Felix are the top three swimmers in the school swim team.

In a recent swimming carnival, David swam 1200 m, Ethan swam 900 m, and Felix swam 1500 m.

- a) What is the ratio of David's to Ethan's to Felix's distances, in simplest form?

1

4:3:5

some didn't simplify !!

- b) In the carnival, the ratio of the total distance swum by David, Ethan, and Felix to the total distance swum by the whole swim team is 9:20.

2

How many metres did the whole team swim?

DEF : rest of team
9 : 20

many found 29 parts in stead of 20!

9 parts = 3600m

1 part = 400m

20 parts = 8000m

READ THE QUESTION !

∴ 8000 m

Question 17 (2 marks)

Solve the equation:

$$7p - 13 = 4(p + 5)$$

2

$$7p - 13 = 4p + 20$$

$$3p = 33$$

$$\therefore p = 11$$

* Well Done by most

Question 18 (2 marks)

A rare collectible card is increasing in value by 4.1% each day due to rising demand.

If the card is currently worth \$2.50, by how much will its value increase in 90 days if the trend continues? Round your answer to the nearest cent.

2

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

$$= 2.50(1+4.1\%)^{90}$$

$$= 93.00$$

$$\text{increase} = 93 - 2.50$$

$$= \$90.50$$

READ THE Q!!

many stopped here!

Needed this final step!

Question 19 (3 marks)

Sophia is driving her car at 80 km/h on dry road. Her braking distance (D metres) is given by the formula:

$$D = 0.01 v^2$$

Where v is speed, measured in km/h.

- a) Calculate her braking distance while travelling at this speed.

1

$$D = 0.01 \times 80^2$$

$$= 64\text{m}$$

* v. good

- b) While travelling at 80 km/h, she notices a branch on the road 90 metres ahead and decides to apply the brakes. Her reaction time is 2.3 seconds.

2

By first calculating Sophia's reaction distance, determine whether she will be able to stop in time before she hits the branch.

$$80000\text{m/h}$$

$$22.22\text{m/s}$$

$$\text{reaction distance} : 51.11\text{m} / 2.3\text{s}$$

$$\text{stopping distance} = 64\text{m} + 51.11\text{m}$$

$$= 115 > 90\text{m}$$

$\therefore$ won't stop in time

No marks for YES or NO !!

stopping distance
= reaction time & braking
dist time
dist

Question 20 (4 marks)

The stem and leaf plot below displays the distribution of pulse rates, measured in beats per minute, of 20 students before and after exercise.

Before Exercise	Pulse Rate	After Exercise
9 8 7 7	6	
9 7 6 5 3 3 2 0	7	
5 3 2 2 1	8	0 1 1 4 6 7 7 9
0	9	2 3 6 8 9
3	10	0 3 9
1	11	3 4
	12	0
	13	
	14	4

students need to learn! SKEWNESS!

- a) Comment on the skewness of the distribution for **before** exercise.

positively skewed poor!

- b) Find the median of the pulse rates of the students **after** exercise.

94.5 ✓ good.

- c) After exercise, one of the students had a heart rate of 144 beats per minute.

Is this student's measurement an outlier for this data set? Justify your answer with calculations.

$$IQR = 106 - 86.5$$

$$= 19.5$$

$$\text{Outlier} > Q_3 + (1.5 \times IQR)$$

$$= 106 + (1.5 \times 19.5)$$

$$= 135.25$$

$$144 > 135.25$$

∴ 144 is an outlier

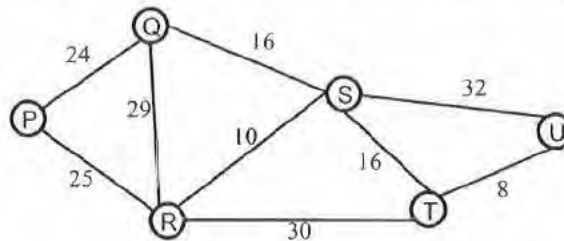
* must show decent working out!

* ctm awarded here!!

Question 21 (2 marks)

Rafael drives from his home at Paradis (P) to his work at Utopia (U).

There are several roads that he can use that pass through four other towns Quark, Raptor, Supernova and Titan. The travel times (in minutes) between each of the towns is shown on the network diagram below.



What is the least time he can take to get to work and through which towns would he travel to achieve this? 2

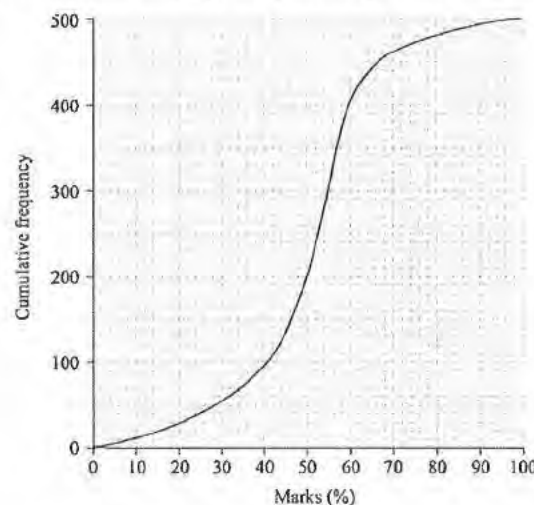
Shortest travel time = 59 min

PRSTU

✓✓ good.

Question 22 (1 mark)

The cumulative frequency curve below displays the percentage marks attained by 500 students in an examination.



Steve was one of the students who sat the examination. 80% of the students scored less than Steve.

What mark did Steve get?

$$80\% \times 500 = 400$$

$$\therefore 60\%$$

✓ ok!

END OF SECTION 2

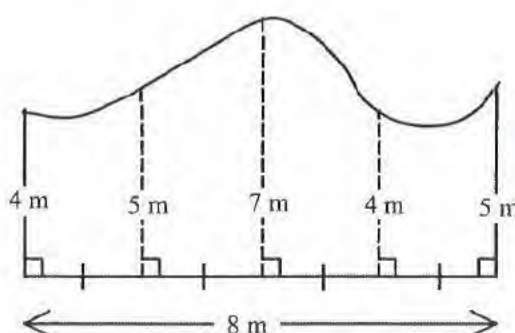
Student's Name: _____

Teacher's Code: _____

Section 3 (15 Marks)

Question 23 (3 marks)

The diagram below shows a bird's eye view of a swimming pool. The pool has three straight sides and one which is curved. The entire pool has the same depth.



lots did
4 applications
ecf = error
carried
forward.

Maria takes the measurements shown of the pool in preparation for filling it with water.

- a) Use the trapezoidal rule with **two** applications to estimate the area of the base of the pool.

2

$$\begin{aligned} A &\approx \frac{4}{2}(4+7) + \frac{4}{2}(7+5) \\ &= 2(11) + 2(12) \\ &= 22 + 24 \\ &= 46 \text{ m}^2 \end{aligned}$$

- b) When the pool is full, it holds 345 000 litres of water.

1

Using the fact that 1 m^3 holds 1000 litres of water, calculate how deep the pool is.

Write your answer in metres, to 1 decimal place.

$$\begin{aligned} 345\,000 \text{ L} &= 345 \text{ m}^3 \\ 345 \div 46 &= 7.5 \text{ m} \end{aligned}$$

⊗ if you divided area then ecf.

Question 24 (2 marks)

The results of the last 400 court cases and what the defendant pleaded are recorded in the following table.

Verdict	Defendants initial plea		
	Guilty	Not Guilty	Total
Guilty	120	34	154
Not Guilty	10	236	246
Total	130	270	400

- a) What is the probability that a person chosen at random had a verdict of **not** guilty?

1

Write your answer as a simplified fraction.

$$\frac{270}{400} = \frac{27}{40} \quad \text{✗}$$
$$\frac{246}{400} = \frac{123}{200} \quad \text{✓}$$

- b) What percentage of the defendants who pleaded 'Not Guilty' were actually found to be guilty?

1

Write your answer to 1 decimal place.

$$\frac{34}{270} \times 100 = 12.6\% \quad \text{✓}$$

Question 25 (4 marks)

George purchased 500 shares at \$43.85 each. Brokerage fees were 2.4% of the total purchase price.

A few months later, George is paid a dividend of \$511.

- a) Calculate the total cost of purchasing the shares.

2

1 mark for or.

$$500 \times 43.85 = 21925$$

$$2.4\% \times 21925 = 526.50$$

$$\therefore \text{Total} = \$22451.20$$

- b) Calculate the dividend yield, correct to 2 decimal places.

2

Most went well.

$$\% \text{ yield} = \frac{511}{21925} \times 100$$

$$= 2.33\%$$

*or $\frac{511}{20} = 1.022$
 $1.022 \times 100 = 2.33\%$
43.85*

Question 26 (3 marks)

Lilah has a reducing balance personal loan. Her monthly repayment (R) is \$560. The payment schedule for the first month has been filled in the table below.

n	Principal (P)	Interest (I)	$P + I$	$P + I - R$
1	20000	175	20175	19615
2	19615	171.63	19786.63	19226.63

- a) What is the monthly rate of reducible interest charged on the loan? Write your answer as a percentage.

1

$$0.875\%$$

- b) Complete the table for the second month of the loan.

2

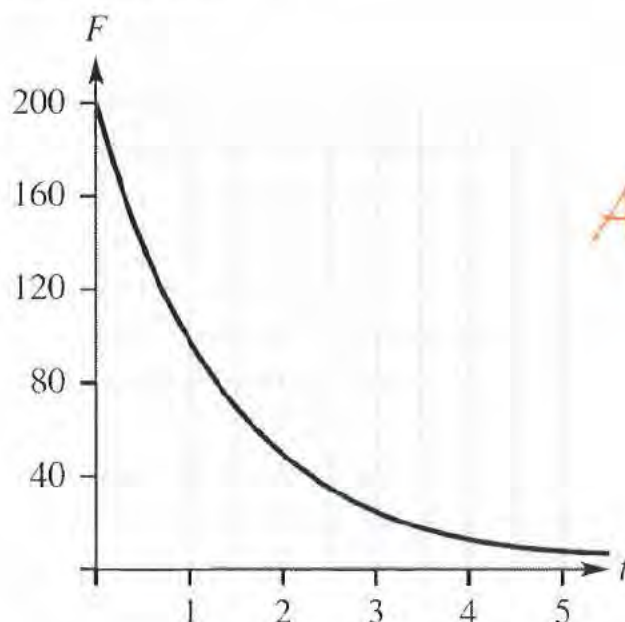
Question 27 (3 marks)

The size of a flock of birds, F , after t years is decaying exponentially using the function:

$$F = A \times (0.5)^t$$

Where A is a constant.

The graph of the equation is shown below.



All went well.

- a) In the equation for the graph above, the value of A is 200. What does A represent? 1

The initial size of the flock of birds

- b) Use the equation to calculate how many birds were present after 3 years. 1

$$F = 200 \times (0.5)^3$$
$$= 25$$

- c) What is the yearly decay rate of the size of the flock of birds? Write your answer as a percentage. 1

50%

END OF SECTION 3

standard 2 trial solutions

Student's Name: _____

Teacher's Code: _____

Marker's Comments.

Section 4 (14 Marks)

Question 28 (2 marks)

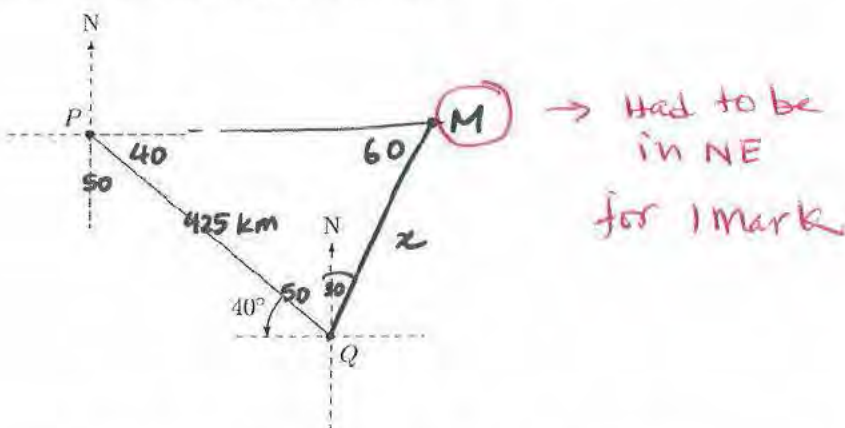
James boards a plane in London at 11 pm on Thursday 12th September and flies for 22 hours before arriving in Sydney.

Given that Sydney's time zone is nine hours ahead of London's, what is the local time, day and date when he arrived in Sydney?

London	→ 22h	Sydney	→ +9h	Sydney	for 2 marks
11 pm		9 pm		6 am	
Thurs		Fri		Sat	
12/9		13/9		14/9	(Missing) 1 mark
		(London time)		(sydney time)	

Question 29 (3 marks)

A plane flies 425 km from P to Q, as shown below. The plane then flies on a bearing of 030°T until it is due East of P. This is point M. Then it flies directly West back to P.



- Finish the flight of the plane and label the above information on the diagram given. You must show point M and the distance of 425 km. 1
- Find the distance QM. Write your answer to the nearest km. 2

$$\frac{x}{\sin 40} = \frac{425}{\sin 60}$$

Several errors with the angle.

$$x = 315.44 \dots$$

$$= 315 \text{ km}$$

Question 30 (3 marks)

Edward and Emily are enrolled in different schools but are doing the same courses in English and Mathematics. When they complete their Trial HSC Exams, they compare their results in Mathematics and English from their separate schools.

Student	English Result	Mathematics Result
Edward (ABC College)	84	Forgotten
Emily (DEF High School)	89	79

The statistical results for the exams at both schools are shown below. All the exam results were normally distributed.

School	English Mean	English Standard Deviation	Mathematics Mean	Mathematics Standard Deviation
ABC College	68	8	62	8
DEF High School	74	6	64	5

- a) Use z-scores to determine which student performed better on their English exam compared to their school cohort. 2

$$\begin{array}{lcl}
 \text{Ed: } \frac{84 - 68}{8} & | & \text{Em: } \frac{89 - 74}{6} \\
 = 2 \text{ SD} & & = 2.5 \text{ SD} \\
 \text{above mean} & & \text{above mean}
 \end{array}$$

∴ Em performed better

2 marks

- b) Edward did not remember his maths mark but did remember being told he had a z-score of +2.5 on the Mathematics exam. 1

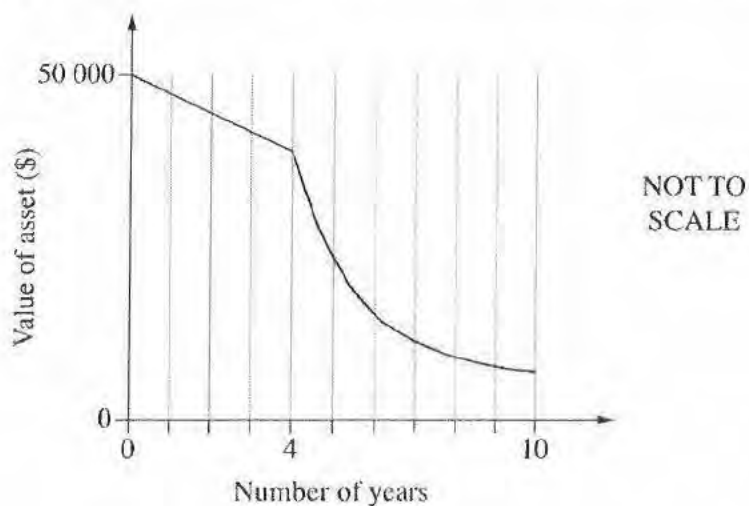
Calculate Edward's raw maths mark.

$$\begin{array}{l}
 2.5 = \frac{x - 62}{8} \\
 x = 82 \quad (\text{only answer accepted})
 \end{array}$$

Question 31 (2 marks)

The graph below shows the decreasing value of a car.

Over the first four years, the value of the car depreciates using a straight-line method of depreciation. After the end of the fourth year, the method of depreciation changed to the declining balance method at a rate of 28% per annum.



- a) By the end of the fourth year, the car's value was \$38 000. What is the rate of depreciation, per year, over the first four years? 1

$$50\,000 - 38\,000 = 12\,000 / 4 \text{ years}$$

$$= \$3\,000 / \text{year}$$

Several had 6% and did not show working (No marks)

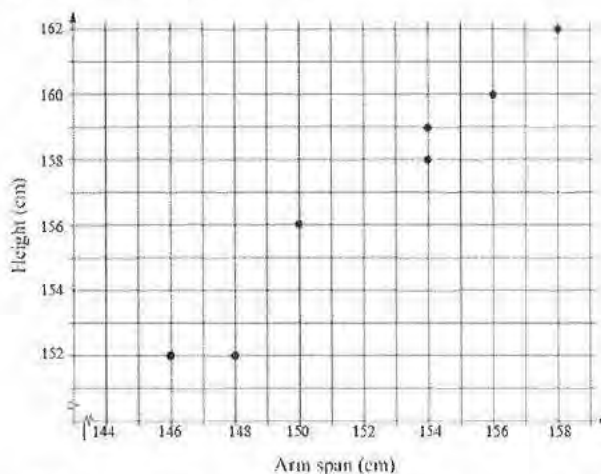
- b) What is the value of the car at the end of the 10 years? Round your answer to the nearest cent. 1

$$S = 38\,000 (1 - 28\%)^6$$

$$= \$5\,293.93$$

Question 32 (4 marks)

A set of bivariate data is collected by measuring the height and arm span of Year 7 students. The graph shows a scatterplot of these measurements.



- a) Calculate the Pearson's correlation coefficient for the data, correct to 2 decimal places. 1

$r = 0.98$ ✓

- b) Identify the direction and strength of the association between height and arm span.
Circle the most appropriate answer. 1

A. No association

☒ B. Strong positive ✓

C. Weak negative

D. Strong negative

- c) The equation of the least-squares regression line is:

$$\text{Height} = B \times \text{arm span} + 25.07$$

- i. Use your calculator to find the value of B , correct to three decimal places. 1

0.866

(Did not penalise on rounding)

- ii. If a student is 173 cm tall, calculate their predicted arm-span using the equation of the least-squares regression line. Write your answer to 1 decimal place. 1

$173 = 0.866 \times A + 25.07$

$A = 170.8 \text{ cm}$ ✓

END OF SECTION 4

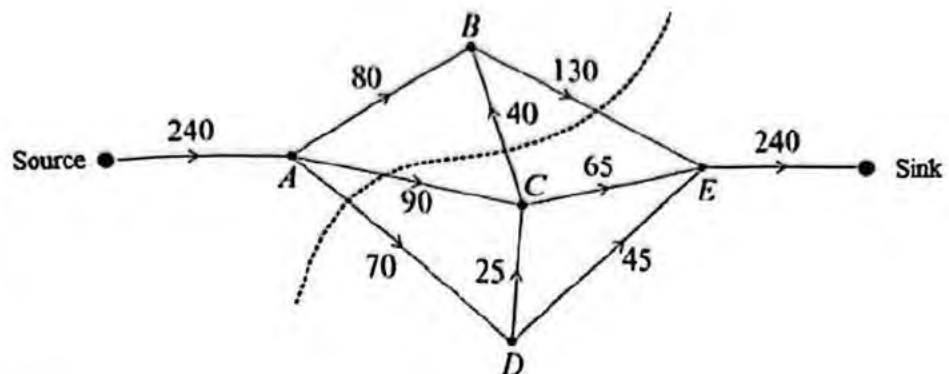
Student's Name: _____

Teacher's Code: _____

Section 5 (13 Marks)

Question 33 (3 marks)

The network diagram below shows the maximum flow rate through a series of pipes in litres per minute.



- a) What is the capacity of the cut shown?

1

$$70 + 90 + 130 = 290 \text{ L/min}$$

Correct answer only

(Students need to recognise that you don't include the "40")

- b) Determine the maximum flow of this network.

2

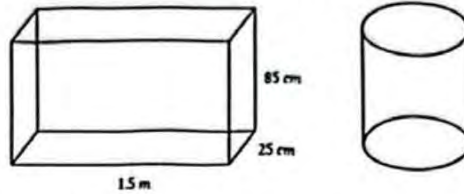
$$80 + 40 + 50 + 15 + 45 = 230 \text{ L/min}$$

Correct answer 2 marks

1 mark for showing correct calculation for 240 L/min.

Question 34 (3 marks)

A block of glass in the shape of a rectangular prism is 1.5 m by 25 cm by 85 cm is melted down and poured into a cylindrical mould that is of the same height as the rectangular prism.



- a) Find the volume of the block of glass in cubic centimetres.

1

$$V = 150 \times 85 \times 25$$

$$= 318\,750 \text{ cm}^3$$

correct answer only
many forgot to convert 1.5 m to 150 cm.

- b) If the cylinder can be filled exactly to the brim, what would the radius of the cylinder be? Write your answer in centimetres, to 2 decimal places.

2

$$V = \pi r^2 h$$

many used wrong formula

$$318\,750 = \pi r^2 \times 85$$

✓ correct substitution into correct formula.

$$r^2 = 1193.662$$

$$r = 34.55 \text{ cm } (r > 0) \checkmark \text{ finding } r$$

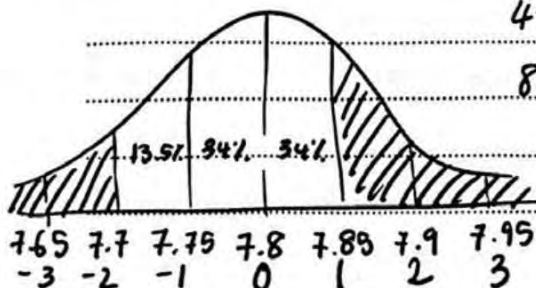
Question 35 (2 marks)

A factory produces metal cylindrical cans.

The cylinders which come off the production line have diameters which are normally distributed with a mean of 7.8 cm and a standard deviation of 0.05 cm. Any cylinder with a diameter greater than 7.85 cm or less than 7.70 cm must be rejected.

If 1800 cans are produced, how many of them are expected to be rejected?

2



$$47.5\% + 34\% = 81.5\%$$

$$81.5\% \times 1800 = 1467 \text{ cans accepted}$$

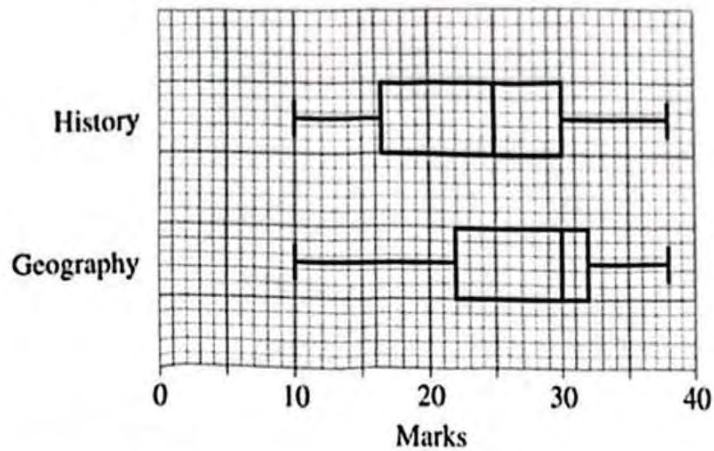
$$\therefore 333 \text{ rejected}$$

1st mark for finding correct percentage

2nd mark for calculating number rejected.

Question 36 (2 marks)

The box-and-whisker plots show the results of a History test and a Geography test.



112 students completed the History test. The number of students who scored above 30 marks was the same for the History test and the Geography test.

Calculate the number of students who completed the Geography test.

2

History: 25% of 112 = 28 ✓ 1st mark

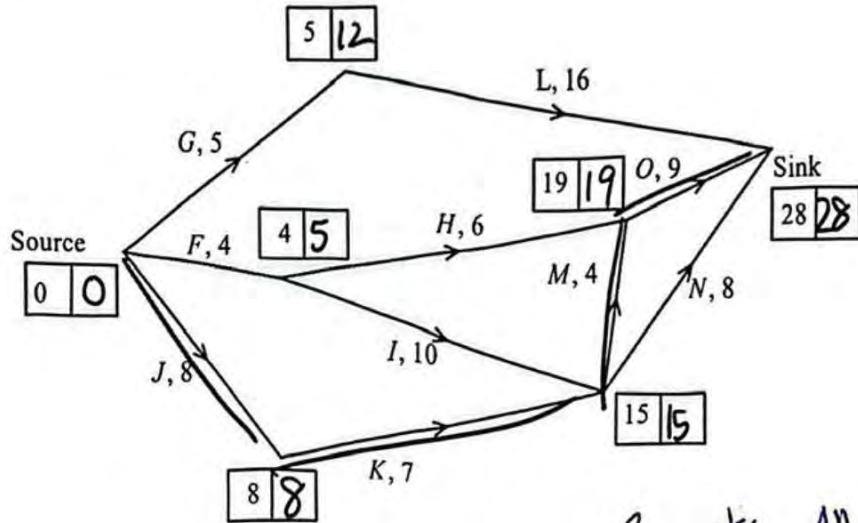
∴ 50% of Geography is 28

$2 \times 28 = 56$ Geo students

2nd mark for correct answer.

Question 37 (3 marks)

The network diagram shows the time needed, in hours, to complete the tasks required for a bathroom renovation project.



2 marks All numbers correct

1 mark 1-2 mistakes only

A forward scan has been completed for the project and the earliest start times are shown on each vertex.

- Complete a backward scan and write the latest finish times in the spaces on each vertex. 2
- List the critical path for the project 1

JKMO ✓ correct critical path.

END OF SECTION 5

Student's Name: _____

Teacher's Code: _____

Section 6 (15 Marks)**Question 38 (4 marks)**

Jasmine is looking to buy a small café business. The lender has provided her with a table of monthly repayments for a \$1000 loan at various interest rates and loan terms.

Interest rate per annum	Term of loan in years					
	5	10	15	20	25	30
6.0%	19.33	11.10	8.44	7.16	6.44	6.00
6.5%	19.57	11.35	8.71	7.46	6.75	6.32
7.0%	19.80	11.61	8.99	7.75	7.07	6.65
7.5%	20.04	11.87	9.27	8.06	7.39	6.99
8.0%	20.28	12.13	9.56	8.36	7.72	7.34

Jasmine has saved \$90,000 to help with the purchase of a \$360,000 café business.

- a) Jasmine decides to use \$40,000 of her savings as a deposit and borrow the remainder over 20 years at 6.5% p.a. Calculate her monthly loan repayment. 2

$$360\,000 - 40\,000 = \$320\,000$$

$$320 \times 7.46 = \$2387.20/\text{month}$$

* Done well

- b) After further discussions, Jasmine realises her maximum monthly repayment capacity is \$1500. The lender agrees to a 6.0% interest rate over 30 years if Jasmine uses her full savings as a deposit. The seller also agrees to drop the asking price by \$10,000. Based on this, can Jasmine afford the café? 2

$$350\,000 - 90\,000 = 260\,000$$

$$260 \times 6 = 1560 > 1500$$

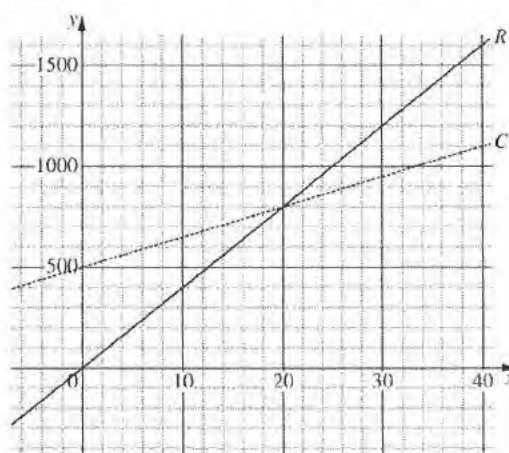
$\therefore$ Jasmine cannot afford the café

* Done well

Question 39 (5 marks)

A business makes and sells T-shirts.

The graph below shows the cost of making the T-shirts (C) and the revenue from selling the T-shirts (R). The x -axis displays the number of T-shirts and the y -axis displays the cost/revenue in dollars.



- a) How many T-shirts need to be sold to break even?

1

20 shirts

* Done well

- b) i. Form an equation for the cost (C) of making the T-shirts (x).

1

$$C = 15x + 500$$

* Done well

- ii. Form an equation for the revenue (R) from selling the T-shirts (x).

1

$$R = 40x$$

* Done well

- iii. Using your equations from part (i) and (ii), determine how many T-shirts need to be sold to earn a profit of \$1800.

1

$$\text{profit: } 40x - (15x + 500)$$

$$\text{profit} = 25x - 500$$

$$1800 = 25x - 500$$

$$2300 = 25x$$

$$\therefore x = 92 \text{ T-shirts}$$

Question 39 continues on the next page

* Students made errors

when they did not combine both formulas (i,ii).

* Many tried to estimate

- c) Approximate the number of T-shirts that need to be sold to break even if the total cost increases by 15%. 1

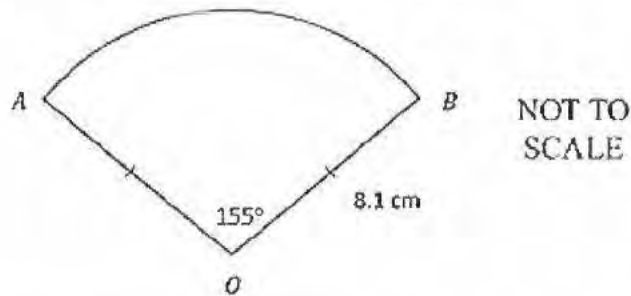
Write your answer to the nearest whole number.

$$\begin{aligned}\text{cost increase} &= 1.15(15x + 500) \\ &= 17.25x + 575 \\ \text{Break even : revenue} &= \text{costs} \\ 40x &= 17.25x + 575 \\ 22.75x &= 575 \\ x &= 25.27 \\ x &= 25 \text{ T-shirts}\end{aligned}$$

* Many students ignored the 15%

Question 40 (2 marks)

The sector AOB has an angle of 155° and is part of a circle with radius 8.1 cm.



Calculate the perimeter of sector AOB , correct to two decimal places.

$$\begin{aligned}P &= 8.1 + 8.1 + \left(\frac{155}{360} \times 2\pi \times 8.1 \right) \\ &= 38.1 \text{ cm}\end{aligned}$$

* Done well
* Some students used Area of a sector not perimeter.

Question 41 (4 marks)

The table below shows the Australian tax rates for the 2024 – 2025 financial year.

Taxable income	Tax on this income
0 - \$18 200	Nil
\$18 201 - \$37 000	19c for each \$1 over \$18 200
\$37 001 - \$90 000	\$3 572 plus 32.5c for each \$1 over \$37 000
\$90 001 - \$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

Kanan is a teacher who earns an annual salary of \$118 500 and an additional \$5400 per year from private tutoring. He is allowed various deductions, including \$280 on textbooks, \$190 on stationery, and **monthly** union fees of \$87.

- a) Calculate Kanan's taxable income.

$$118\,500 + 5400 - [280 + 190 + (12 \times 87)]$$

$$= \$122\,386$$

* Done well

* Some forgot to multiply 12 x 87

- b) Calculate Kanan's income tax payable.

$$20\,797 + [0.37 + (122\,386 - 90\,000)]$$

$$= \$32\,779.82$$

* Done well

- c) Kanan was required to pay 1.25% of his taxable income as a Medicare levy. Calculate the Medicare levy on Kanan's taxable income.

$$1.25\% \times 122\,386 = \$1529.83$$

* Some multiplied by 1.25 not %

- d) Kanan has already paid \$26 000 in PAYG tax instalments throughout the year.

Calculate the total amount Kanan still owes after accounting for his PAYG tax instalments, income tax payable, and Medicare levy.

$$(1529.83 + 32\,779.82) - 26\,000$$

$$= \text{owes } \$8309.65$$

* This was poorly answered, a lot

END OF SECTION 6

forgot to add Medicare levy before subtracting from Tax payable.

Student's Name: _____

Teacher's Code: _____

Section 7 (11 Marks)

Question 42 (2 marks)

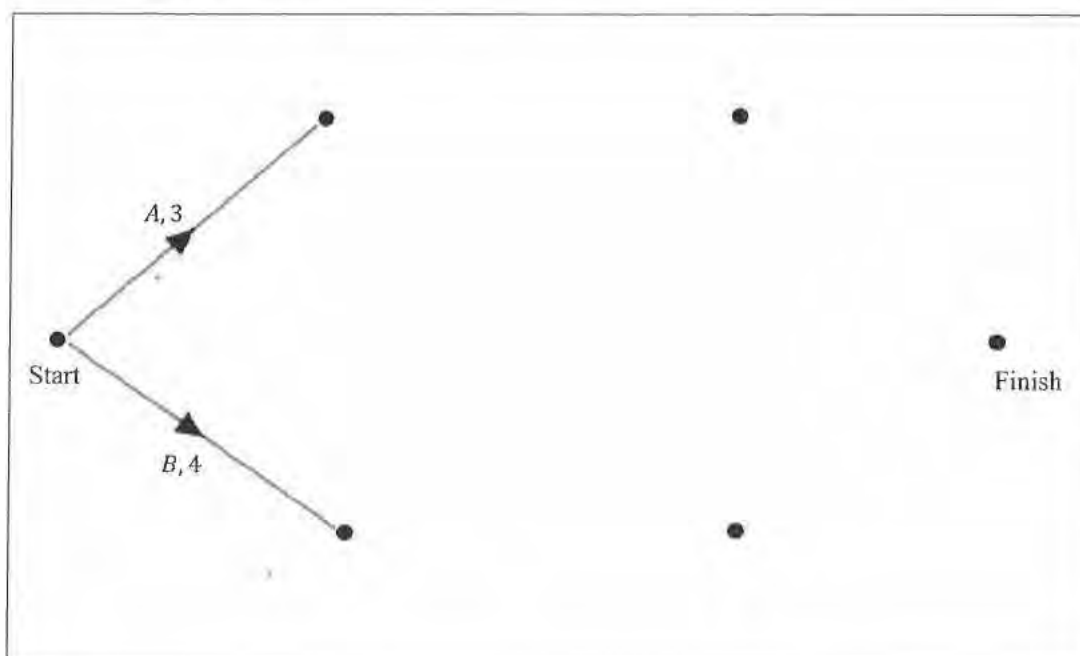
The activity chart below shows the immediate prerequisites and required hours for each activity to be completed in a project.

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

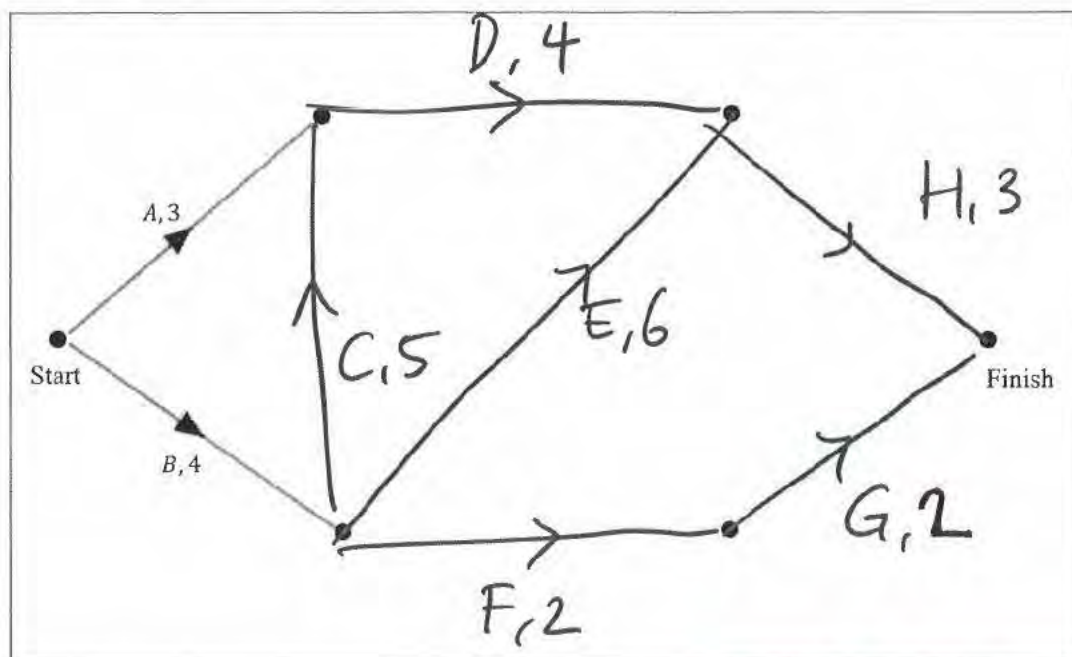
- a) Complete the rest of the network diagram for this project.

You may use the space below to practise.

Draft diagram (not marked)



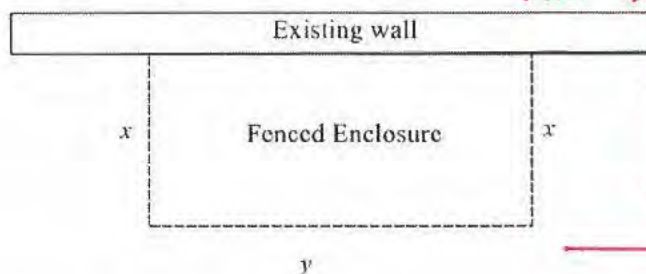
Question 42 continues on the next page



Question 43 (5 marks)

Sarah plans to build a rectangular enclosure for her new chickens against an existing wall, using 16 metres of wire fencing as shown below.

The enclosure has width x and length y .



* Well answered.
* Some candidates didn't include arrows.
* some students lost marks for including dummy activities that were not necessary for this network.

- a) Sarah reasons that $y = 16 - 2x$.

* Poorly answered. 1

Given that the area of a rectangle is given by $A = \text{length} \times \text{width}$, show that the area of the enclosure can be written as $A = 16x - 2x^2$.

$$A = xy$$

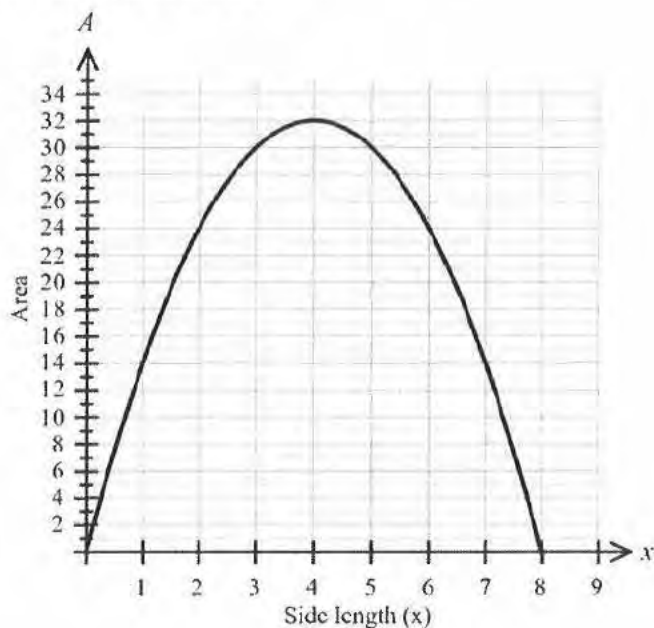
$$= x(16 - 2x)$$

$$= 16x - 2x^2$$

← This was required for the mark.

Question 43 continues on the next page

The graph of $A = 16x - 2x^2$ is shown below.



Well answered.

- b) Use the graph to determine the two values of x which would give the enclosure an area of 24 m^2 and then give the dimensions (i.e., length and width) of the enclosure in each case. 2

$$x = 2 \text{ m or } x = 6 \text{ m}$$

$$y = 12 \text{ m} \quad y = 4 \text{ m}$$

* 1-mark awarded for using the graph to find $x = 2$ and $x = 6$

* 1-mark awarded for finding the widths.

- c) Calculate the perimeter of the fenced enclosure (excluding the existing wall) when the maximum possible area is achieved. 2

Maximum area is 32 m

↳ side lengths $x = 4 \text{ m}$, $y = 8 \text{ m}$

↳ ∴ Perimeter, excluding wall $\rightarrow 4 + 4 + 8$

* some candidates overlooked MAXIMUM = 16 m

* Some candidates lost marks for incorrect working (eg. $6 + 6 + 4$).

* Poorly - answered.

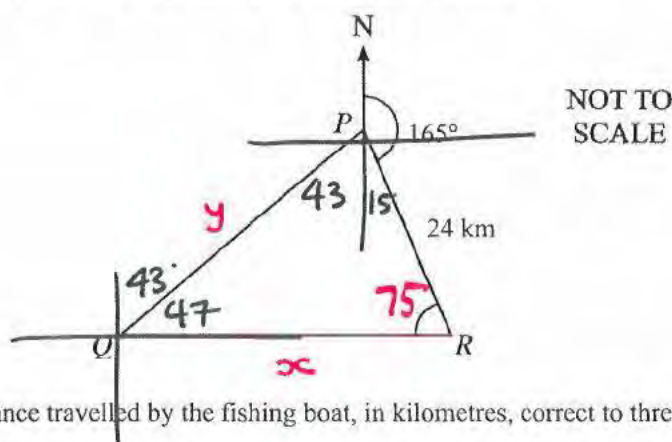
Well answered.

Question 44 (4 marks)

A fishing boat leaves a harbour at P and travels on a bearing of 165° for 24 km to a fishing spot at R .

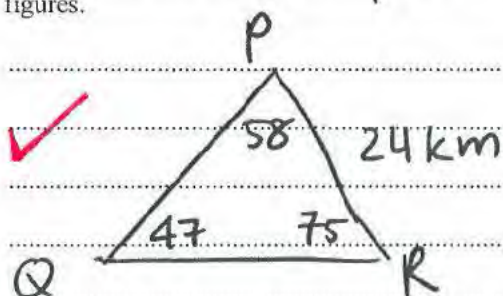
From R , the boat travels due west to another fishing spot at Q .

The final part of the boat's journey is on a bearing of 43° from Q back to P .



Calculate the total distance travelled by the fishing boat, in kilometres, correct to three significant figures. 4

1 mark ✓



1 mark ✓ $\frac{x}{\sin 58} = \frac{24}{\sin 47}$ $\frac{y}{\sin 75} = \frac{24}{\sin 47}$ * consequential marks awarded

$x = 27.8294$ 1 mark $y = 31.6977$ if angles were used that were incorrect.

Total: $27.8294 + 31.6977 + 24$
 $= 83.527$
 $= 83.5 \text{ km (3.s.f.)}$

* consequential marks for process; must be 3 s.f.

END OF SECTION 7

END OF PAPER

Full marks awarded to candidates w/ correct answer to 3 s.f.