SHORE

Set

Student Number

2024 **TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION**

Mathematics Standard 2

General Instruction

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- Write using non-erasable black pen
- Calculators approved by NESA may be used
- A reference sheet is provided
- For questions in Section II, show relevant mathematical reasoning and/or calculations
- Write your Set and Student Number at the top of each booklet

Total marks: 100

Section I – 15 marks (pages 2–8)

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

Section II – 85 marks (pages 9–48)

- Attempt Questions 16–39
- Allow about 2 hours and 5 minutes for this section

DO NOT REMOVE THIS PAPER FROM THE EXAMINATION ROOM

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

Use the multiple-choice answer sheet for questions 1−15

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1 What compass bearing is equivalent to a true bearing of 215°?

A. S35°E

B. S55°E

C. S35°W

D. S55°W

2 Oliver bought a car for $40 000. Following straight line depreciation for 3 years, the car was worth $11 200.

What was the annual amount of depreciation for Oliver's car?

A. $3733

B. $9600

C. $17 067

D. $28 800

3 A network diagram with 9 vertices has 14 edges.

How many edges must be removed to leave a minimum spanning tree?

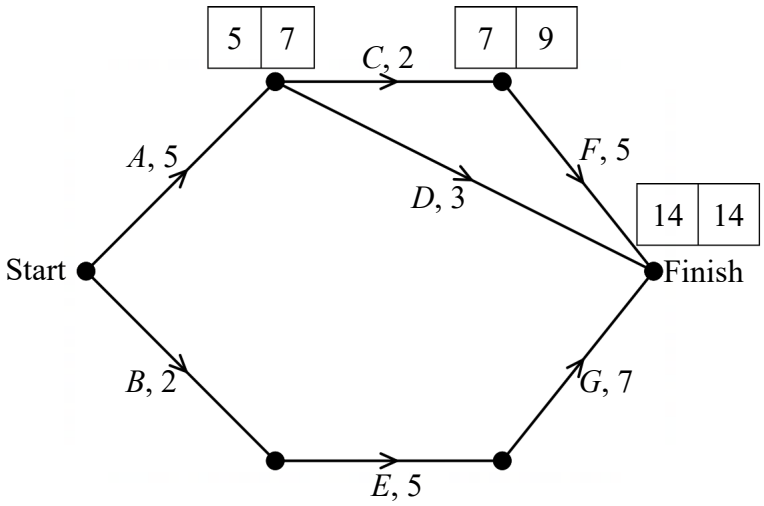
A. 5

B. 6

C. 8

D. 9

4 The network diagram below shows all of the activities involved in the completion of a project, along with the earliest start time and latest start time, in hours, for some of the activities involved.



What is the float time for activity *D*?

A. 2 hours

B. 4 hours

C. 5 hours

D. 6 hours

5 In a class at Oldington Grammar the ratio of boys to girls is 5 : 4.
On Tuesday, 6 girls were absent from class and the ratio of boys to girls was 5 : 2.

How many boys are in the class?

A. 12

B. 15

C. 27

D. 30

6 The score of 55 would be considered an outlier in the data set with which five-number summary?

A. 24, 25, 38, 43, 55

B. 24, 36, 38, 47, 59

C. 55, 60, 65, 83, 97

D. 53, 62, 65, 66, 85

7 Benjamin is charged 31.9 cents per kWh for energy usage.

How much will Benjamin pay to use a 200 watt television for 2 hours every day for one year?

A. \$23.29

B. \$46.57

C. \$127.60

D. \$146.00

8 Brodie is in Sydney $\left(39^\circ\text{S},151^\circ\text{E}\right)$ and his friend Aly is in Kaedi $\left(16^\circ\text{N},14^\circ\text{W}\right)$.

Brodie calls Aly at 8 am Monday, Sydney time.

Using the difference in longitude, approximately what time did Aly receive the call?

A. 9 pm Sunday

B. 11 pm Sunday

C. 5 pm Monday

D. 7 pm Monday

9 Byron owns 50 shares in Sure Education Inc. He purchased them for \$2 each. When they were each worth \$4.20, Byron received a total dividend of \$10.50.

What was the dividend yield of Byron's shares?

A. 5.0%

B. 10.5%

C. \$0.21

D. \$2.41

10 In a normally distributed set of data, what percentage of the scores are more than 3 standard deviations above the mean?

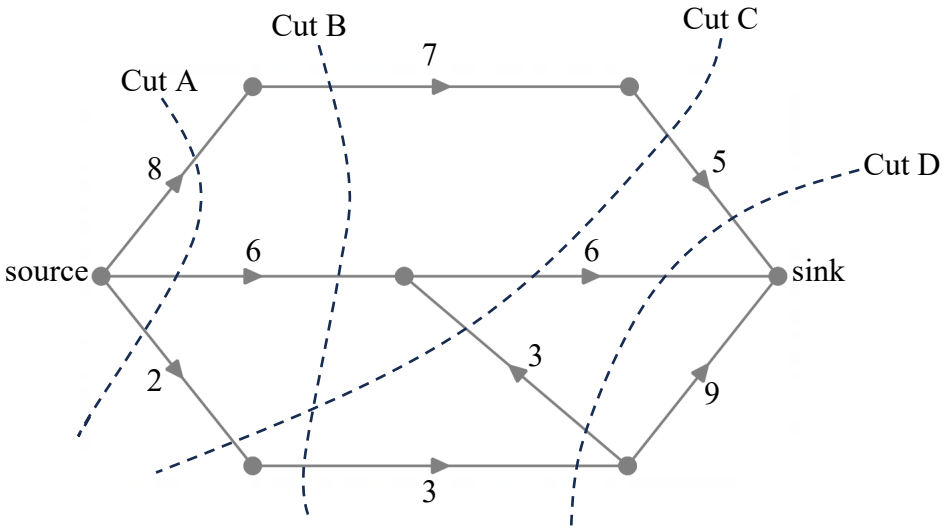
A. 0.15%

B. 0.30%

C. 2.50%

D. 5.00%

11 Consider the network shown below.



Which of the cuts shown could be used to find the maximum flow from source to sink?

A. Cut A

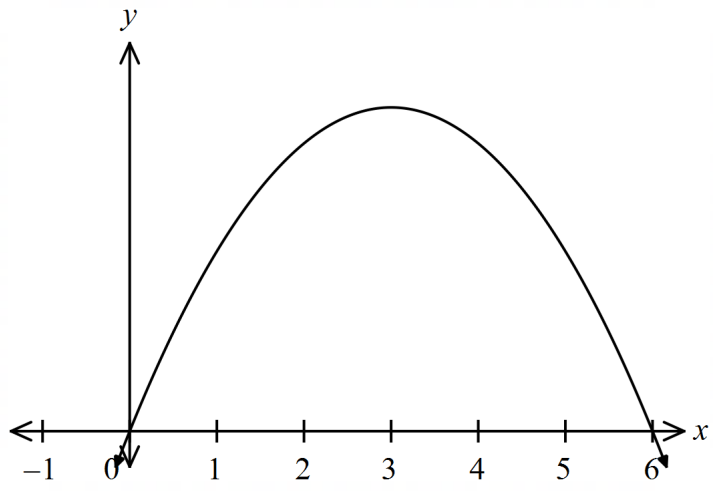
B. Cut B

C. Cut C

D. Cut D

12 The height (h metres) of a rugby ball t seconds after Jake kicks it is given by $h = -5t(t-6)$.

The graph of $y = -5x(x-6)$ is shown below.



What is the maximum height of the ball Jake kicked and when does it occur?

A. 30 metres after 3 seconds

B. 45 metres after 3 seconds

C. 30 metres after 6 seconds

D. 45 metres after 6 seconds

13 The braking distance in metres of a car is given by $d = \dfrac{s^2}{250f}$ where s is the speed of the car in km/h when the brakes are applied, and f is the coefficient of friction.

The coefficient of friction is:

- 0.1 on ice roads
- 0.4 on wet roads
- 0.7 on dry roads

Ayrton is driving at 60 km/h during rain when he sees an obstacle up ahead. He takes 0.8 seconds to react and then applies the brakes.

Which of the following would be closest to the stopping distance of Ayrton's car?

A. 29 metres

B. 36 metres

C. 49 metres

D. 53 metres

14 Ed deposits contributions of \$1000 at the end of each month into an account that initially had \$2000 in it. The account pays interest of 12% per annum, compounded monthly.

Which of the following recurrence relations could model the value of Ed's annuity after n contributions?

A. $A_0 = 1000$, $A_n = 1.12 \times A_{n-1} + 2000$

B. $A_0 = 2000$, $A_n = 1.12 \times A_{n-1} + 1000$

C. $A_0 = 1000$, $A_n = 1.01 \times A_{n-1} + 2000$

D. $A_0 = 2000$, $A_n = 1.01 \times A_{n-1} + 1000$

15 The IQs of Year 12 Shaw School students are normally distributed with mean μ and standard deviation σ.

For this group, 16% of IQ scores are below 96 and 2.5% of the scores are above 132.

Which of the following is true of these IQ scores?

A. $\mu = 108$, $\sigma = 12$

B. $\mu = 108$, $\sigma = 18$

C. $\mu = 112$, $\sigma = 12$

D. $\mu = 112$, $\sigma = 18$

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet

A

Section II

85 marks
Attempt Questions 16-39
Allow about 2 hours 5 minutes for this section

Booklet A — Attempt Questions 16-22 (17 marks)
Booklet B — Attempt Questions 23-26 (17 marks)
Booklet C — Attempt Questions 27-31 (17 marks)
Booklet D — Attempt Questions 32-35 (17 marks)
Booklet E — Attempt Questions 36-39 (17 marks)

Instructions

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

Please turn over

Section II

85 marks
Attempt Questions 16–39
Allow about 2 hours and 5 minutes for this section

Answer the questions in the spaces provided.

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

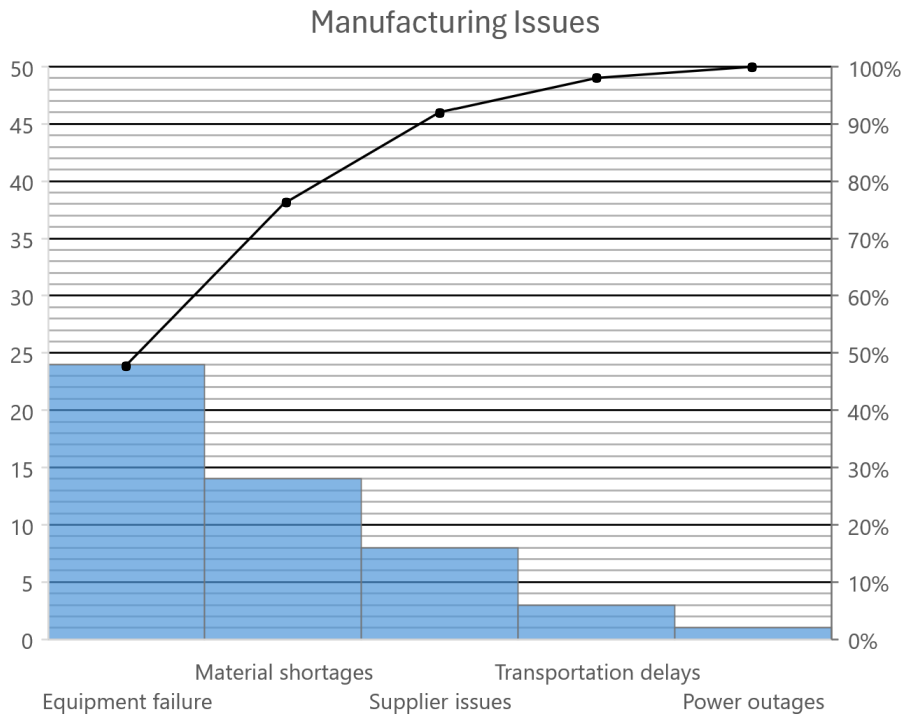
Extra writing space is provided at the end of each question booklet. If you use this space, clearly indicate which question you are answering.

Assume 52 weeks in a year, and 365 days in a year where necessary.

Booklet A: Questions 16 – 22 (17 marks)

Question 16 (2 marks)

The Pareto chart shown below shows the manufacturing issues in a factory last year.



(a) How many of the manufacturing issues were caused by "Transportation delays"? **1**

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(b) What percentage of the manufacturing issues were caused by "Supplier issues"? **1**

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Question 17 (1 mark)

Werner drove 420 kilometres in his hybrid car and had fuel consumption for the trip of 4.7 L / 100 km. **1**

How many litres of fuel did Werner use on this trip?

Question 18 (2 marks)

The annual income earned by a married couple Bob and Janice is in the ratio 3 : 5. **2**

If Bob earns $112 500 per year, find the total income earned by the couple.

Question 19 (2 marks)

Sean invested \$5000 for 6 years at 5.4% per annum, compounded annually. **2**

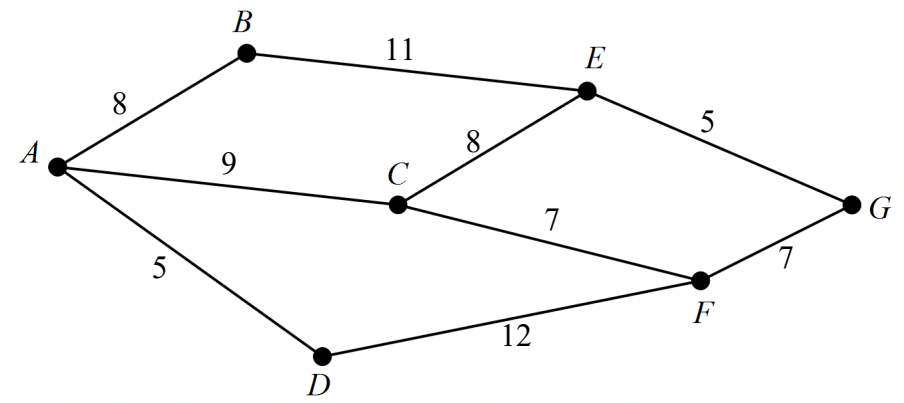
Show that the equivalent simple annual interest rate to produce the same return as Sean's investment is approximately 6.18% per annum.

Question 20 (2 marks)

Solve the equation $5-\frac{x}{3}=2x$. **2**

Question 21 (2 marks)

Nick wants to travel from town A to town G to visit Angus on the network shown below. **2**
The network diagram below shows distances between towns A to G in kilometres.



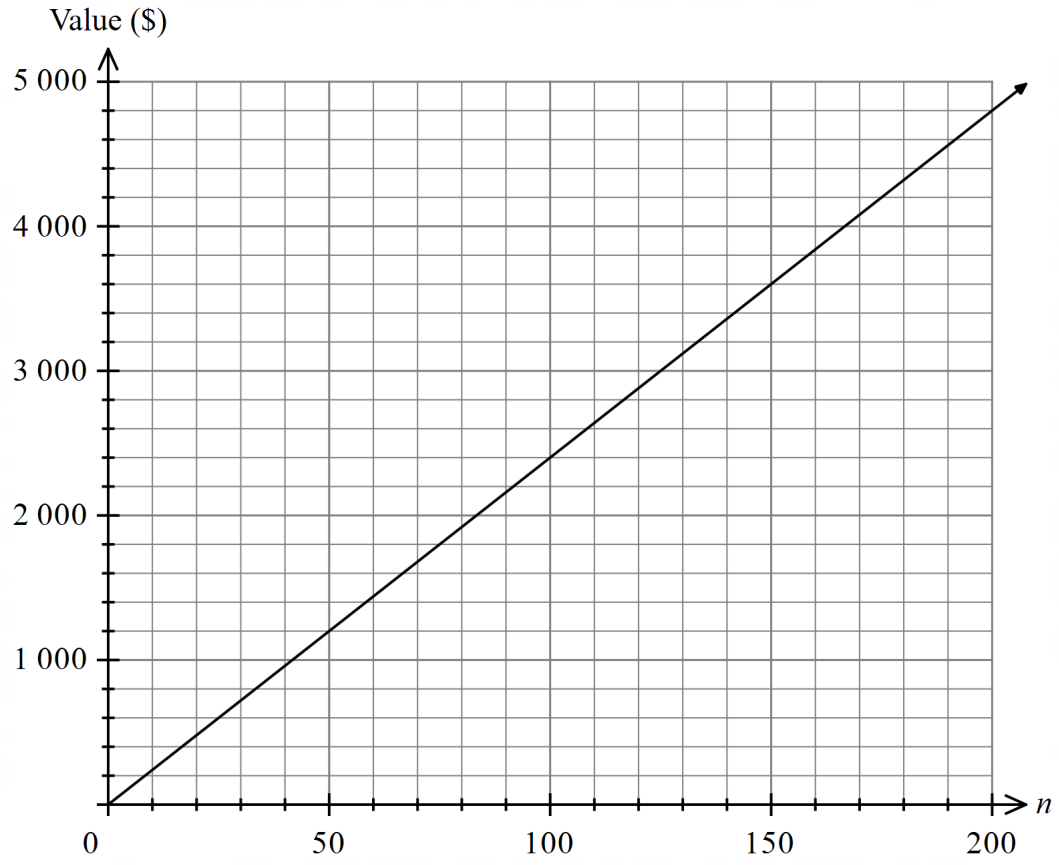
Find the shortest path Nick can take to visit Angus and its distance.

Question 22 (6 marks)

Tom runs his own business; Tom's Trinkets.

Each trinket is sold for the same fixed price.

The weekly income for the business for selling n trinkets is sketched on the graph below.



(a) Find the selling price of each trinket. **1**

(b) Each week, Tom has fixed costs of $1200 and production costs of $9 per trinket. **2**

Complete the cost ($) equation below and **use it to sketch** Tom's costs on the axes above.

$$C = _____$$

Question 22 continues on page 15

Question 22 (continued)

(c) How many trinkets must Tom sell to break even? **1**

(d) Shade the 'profit zone' on the graph. **1**

(e) Last week, Tom unfortunately made a loss of $600. **1**

How many trinkets did Tom sell last week?

End of Question 22

End of Booklet A

Questions 16 – 22 Extra writing space
If you use this space, clearly indicate which question you are answering.

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

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Section II Answer Booklet B

Booklet B — Attempt Questions 23-26 (17 marks)

Instructions

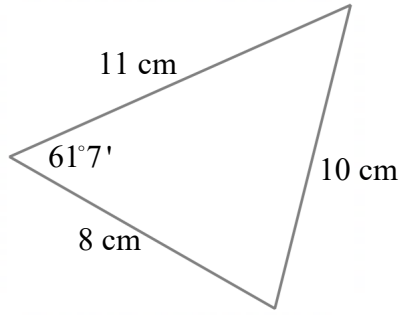
- Write your Examination Number and Set at the top of this page.
- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing space is provided on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

Please turn over

Booklet B: Questions 23 – 26 (17 marks)

Question 23 (2 marks)

The diagram shows a triangle with side lengths 8 cm, 10 cm and 11 cm. **2**

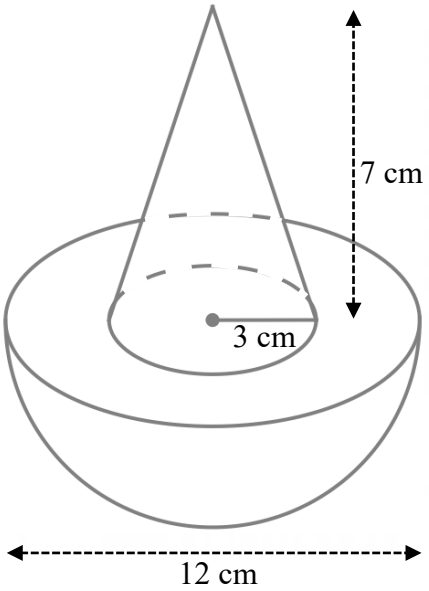


NOT TO SCALE

Find the area of the triangle, leaving your answer correct to the nearest square centimetre.

Question 24 (4 marks)

An ornamental spinner is formed by joining a hemisphere to a cone with measurements as shown below. **4**



NOT TO SCALE

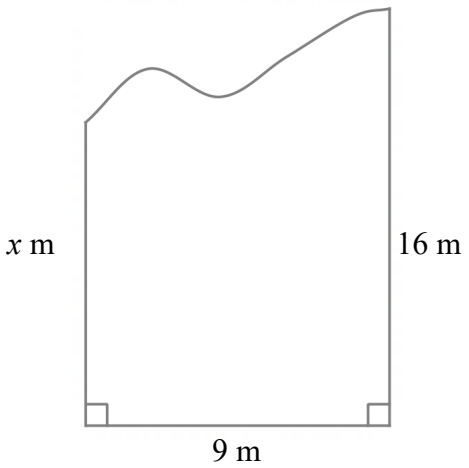
Find the total volume of the spinner, leaving your answer correct to 3 significant figures.

Question 25 (5 marks)

The equation for trapezoidal rule is $A \approx \frac{h}{2}\left(d_f + d_l\right)$.

(a) Express d_f as the subject of the equation. **2**

(b) Consider the block of land in the diagram below. Using the trapezoidal rule, the area of this block of land is approximately 126 m^2. **1**



NOT TO SCALE

Find the value of x.

Question 25 continues on page 21

Question 25 (continued)

(c) Last night 35 mm of rain fell across the whole region containing this block of land. Find the total volume of rain that fell on the block last night in kilolitres. **2**

Question 26 (6 marks)

The table shows the future values of an annuity of $1.

Periods	Interest rate per period				
	2.0%	**2.5%**	**3.0%**	**3.5%**	**4.0%**
4	4.1216	4.2853	4.1836	4.2149	4.2465
5	5.2040	5.2563	5.3091	5.3625	5.4163
6	6.3081	6.3877	6.4684	6.5502	6.6330
7	7.4343	7.5474	7.6625	7.7794	7.8983
8	8.5830	8.7361	8.8923	9.0517	9.2142
9	9.7546	9.9545	10.1591	10.3685	10.5828
10	10.9497	11.2034	11.4639	11.7314	12.0061

Two friends devised savings plans so that they could go on a holiday together after finishing university.

(a) Max contributed $500 at the end of every six months into a high interest account paying 6% interest per annum, compounded six-monthly. **2**

If Max sticks to his plan, find how much his investment will be worth in 4 years.

(b) Max's friend Josh made sure he had the same amount saved in the 4 years by investing a single amount at the start. **2**

What single amount did Josh invest at the same rate and compounding period to produce the same return over the 4 years?

Question 26 continues on page 23

Question 26 (continued)

(c) Find how much more interest was earned by Josh than Max in the 4 years. **2**

End of Booklet B

Questions 23 – 26 Extra writing space

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

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Section II Answer Booklet C

Booklet C — Attempt Questions 27-31 (17 marks)

Instructions

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

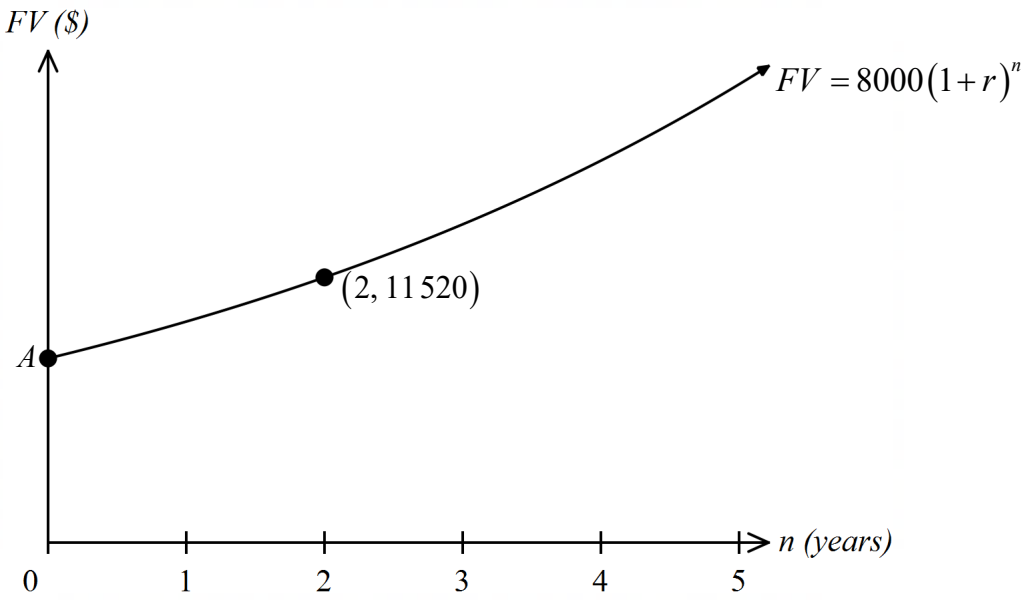
Please turn over

Booklet C: Questions 27 – 31 (17 marks)

Question 27 (4 marks)

The value of one of Warren's investments is growing exponentially according to the formula $FV = 8000(1+r)^n$, where r is the percentage growth rate and n is the number of years after 1st January 2020. On 1st January 2022, the investment was worth \$11 520.

The incomplete graph of Warren's investment is shown below.



(a) State the value of A, the vertical intercept of the graph. **1**

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(b) Find the value of r, leaving your answer as a percentage. **2**

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(c) Find the value of the investment on 1st January 2026 if it continues to grow at the same rate. **1**

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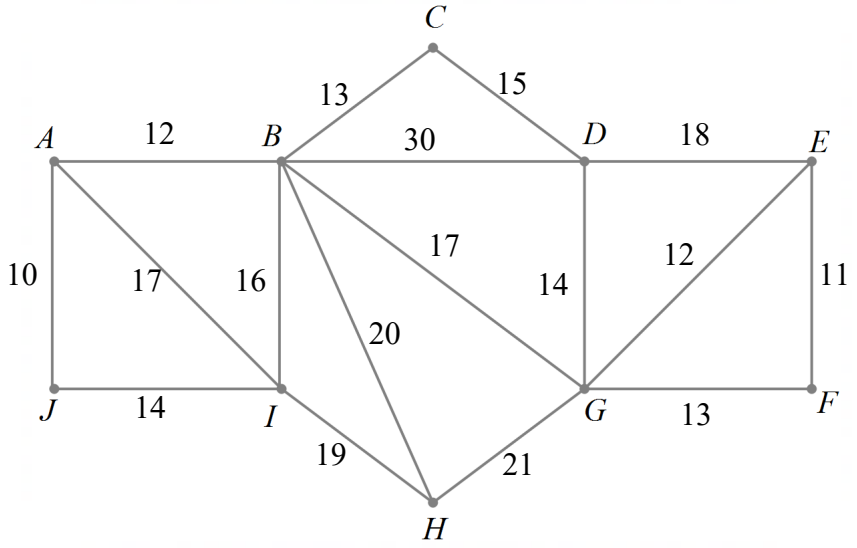
Question 28 (3 marks)

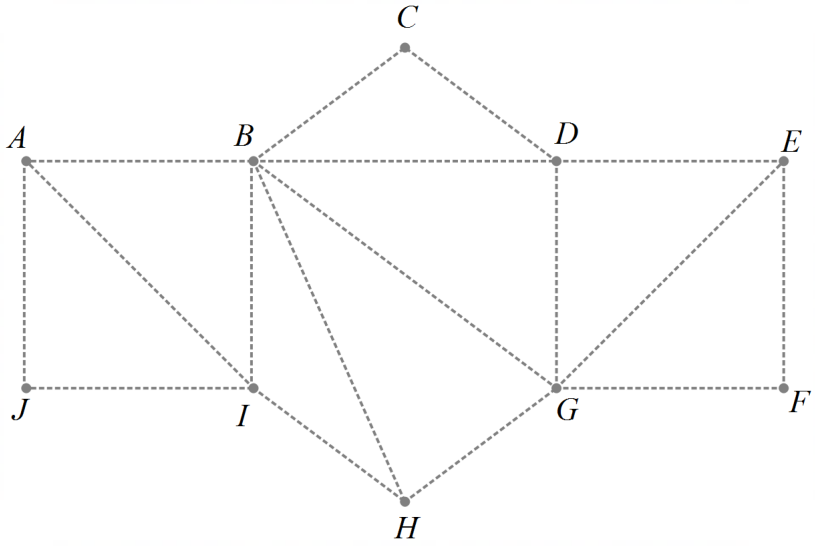
Alex is opening a fun fair with rides A to J as shown in the network diagram below.



NOT TO SCALE

The edge lengths shown represent the lengths in metres of the paths between the rides.

(a) On the diagram below, complete the minimum spanning tree and state the minimum total length of paths to keep every ride connected. **2**



Length = _____

(b) Alex is given a quote of \$4600 to concrete the paths in this minimum spanning tree. **1**

Find the cost per metre being charged for the paths.

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Question 29 (3 marks)

The first table below shows the income tax rates for the 2023-2024 financial year. The tax rates for the 2024-2025 financial year are also shown. The brackets and rates were changed in 2024-2025 to give a 'tax cut' to most taxpayers. **3**

Tax Rates 2023-2024

Taxable income	**Tax on this income**
0 – $18,200	Nil
$18,201 – $45,000	19c for each $1 over $18,200
$45,001 – $120,000	$5,092 plus 32.5c for each $1 over $45,000
$120,001 – $180,000	$29,467 plus 37c for each $1 over $120,000
$180,001 and over	$51,667 plus 45c for each $1 over $180,000

Tax Rates 2024-2025

Taxable income	**Tax on this income**
0 – $18,200	Nil
$18,201 – $45,000	16c for each $1 over $18,200
$45,001 – $135,000	$4,288 plus 30c for each $1 over $45,000
$135,001 – $190,000	$31,288 plus 37c for each $1 over $135,000
$190,001 and over	$51,638 plus 45c for each $1 over $190,000

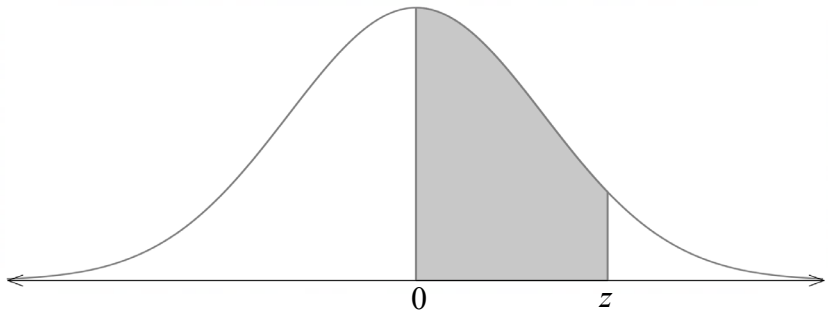
Stef had a taxable income of $153 000 in financial year 2023-2024 and the same taxable income in 2024-2025. Find the size of Stef's 'tax cut' for the financial year 2024-2025.

Question 30 (4 marks)

A random variable is normally distributed with mean 0 and standard deviation 1. The table gives the probability that this random variable lies between 0 and z for different values of z.

z	0.2	0.4	0.6	0.8	1.0
Probability	0.0793	0.1554	0.2258	0.2881	0.3413

The probability values given in the table for different values of z are represented by the shaded area in the following diagram.



(a) German Short-haired Pointers (GSP's) have mean life expectancy of $\mu = 13$ years, and standard deviation $\sigma = 2.5$ years. **1**
Find the z-score for a GSP that lives 15 years.

(b) Andrew owns a GSP. **3**
What is the probability that Andrew's GSP lives to between 12 and 15 years of age?

Question 31 (3 marks)

James used his credit card on 12th August to purchase a new suit for \$750. **3**

On 23rd August he repaid \$300.

A statement for the credit card was issued on the last day of August.

The statement for August showed that interest was charged at 0.0383% per day, compounded daily, from (and including) the date of purchase up to (and including) the date of payment.

Calculate the remaining amount for James to pay on the last day of August so that the card is paid off in full (\$0 balance).

End of Booklet C

Questions 27 – 31 Extra writing space
If you use this space, clearly indicate which question you are answering.

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

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Section II Answer Booklet D

Booklet D — Attempt Questions 32-35 (17 marks)

Instructions

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

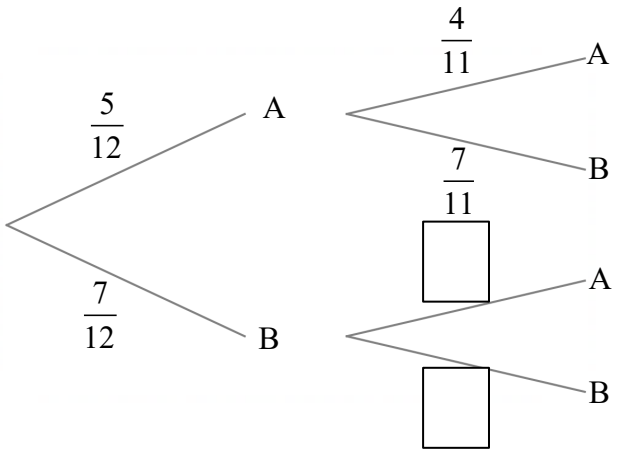
Please turn over

Booklet D: Questions 32 – 34 (17 marks)

Question 32 (2 marks)

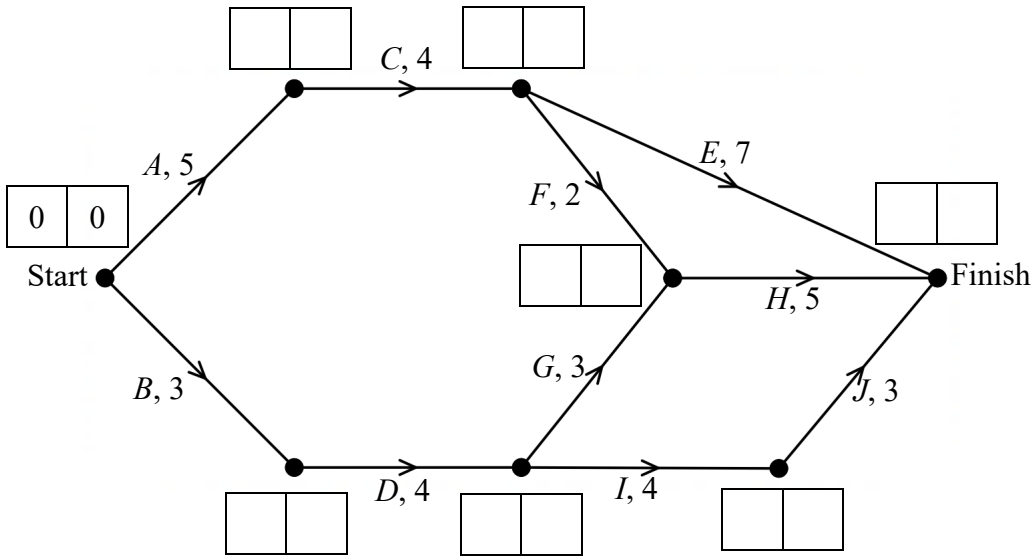
In a bag are 5 aqua marbles and 7 black marbles. **2**
Two marbles are simultaneously selected from the bag at random.

Complete the probability tree below and use it to find the probability of at least one of the two selected marbles being black.



Question 33 (5 marks)

Activities *A* to *J* are part of the set-up of a campsite by a group of campers. The network diagram below shows these activities and their completion time in minutes.



(a) Complete a forward and backward scan on the network diagram, showing the EST and LST at each vertex. **2**

(b) State the critical path(s). **1**

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(c) A helpful stranger at the campsite is willing to help these campers complete one of the activities. The stranger's help will save 2 minutes on this activity. **2**

Find an activity that the helpful stranger could complete to save time for the set-up of the campsite and how much time it would save the group overall.

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Question 34 (8 marks)

'Life expectancy' measures how long, on average, a person is expected to live from the time they are born.
The following table shows the life expectancy of Australian females.

Year of birth (n)	1900	1920	1940	1960	1980	2000	2020
Life expectancy (L years)	54.8	63.3	66.2	74.2	78.5	82.6	85.3

(a) Find the value of the correlation coefficient correct to 3 decimal places and hence describe the strength and nature of the relationship between the variables. **2**

(b) Use your calculator to find the equation of the least squares regression line, writing each value correct to 3 decimal places. **2**

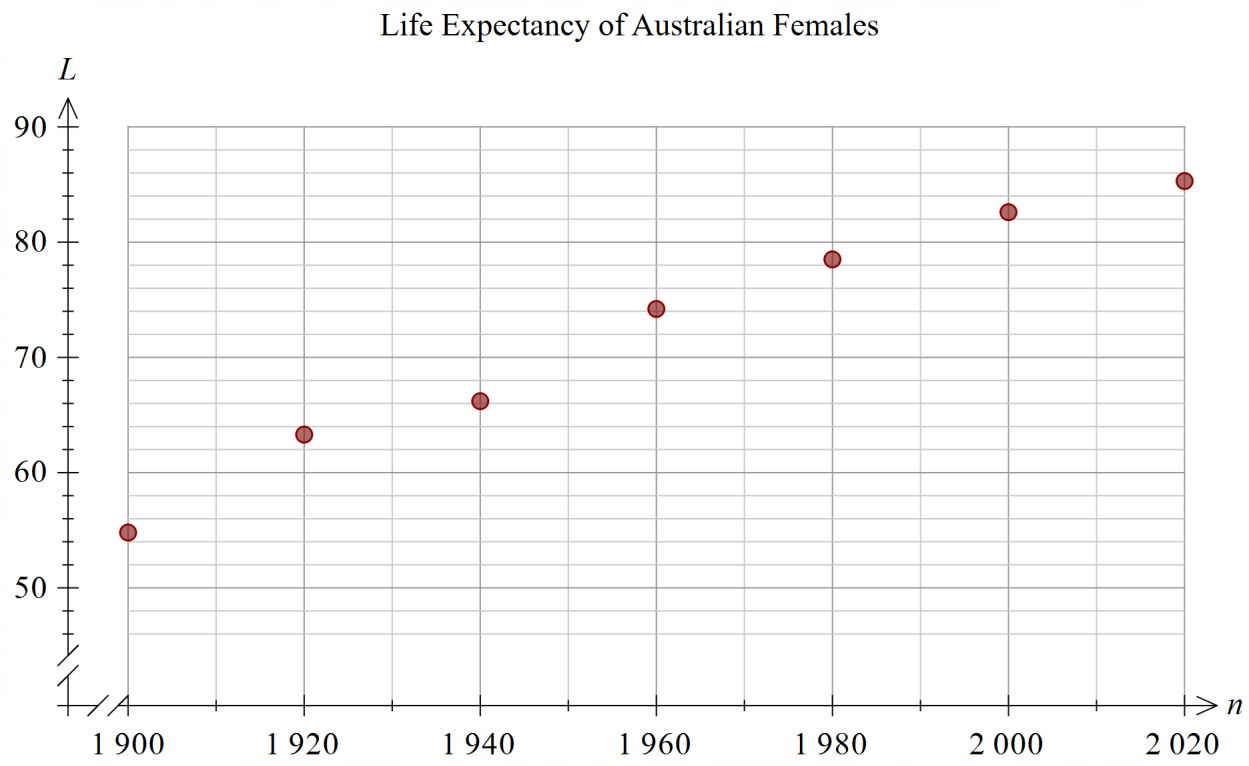
(c) Use your equation to predict the year of birth when the life expectancy of Australian females will first reach 100 years. **1**

Question 34 continues on page 37

Question 34 (continued)

(d) Explain why you might not be confident in the life expectancy of Australian females actually reaching 100 years in your answer to part (c). **1**

(e) The data has been plotted on the graph below. **2**



Sketch the line with the equation you found in part (b) on the graph above.

Question 35 (2 marks)

Harrison is studying a population of lizards in a grassland and used the capture-recapture technique to estimate the size of the population. He initially captured, tagged and released 40 of these lizards. **2**

A month later he again captured 40 lizards from the same grassland. He found that 5 of the first 15 lizards he examined from this second group were tagged.

How many of the remaining 25 lizards in the sample were tagged if Harrison's estimate for the lizard population in the grassland was 123 lizards?

End of Booklet D

Questions 32 – 35 Extra writing space
If you use this space, clearly indicate which question you are answering.

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Section II Answer Booklet

E

Booklet E — Attempt Questions 36-39 (17 marks)

Instructions

- Write your Examination Number and Set at the top of this page.
- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
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Please turn over

Booklet E: Questions 36 – 39 (17 marks)

Question 36 (2 marks)

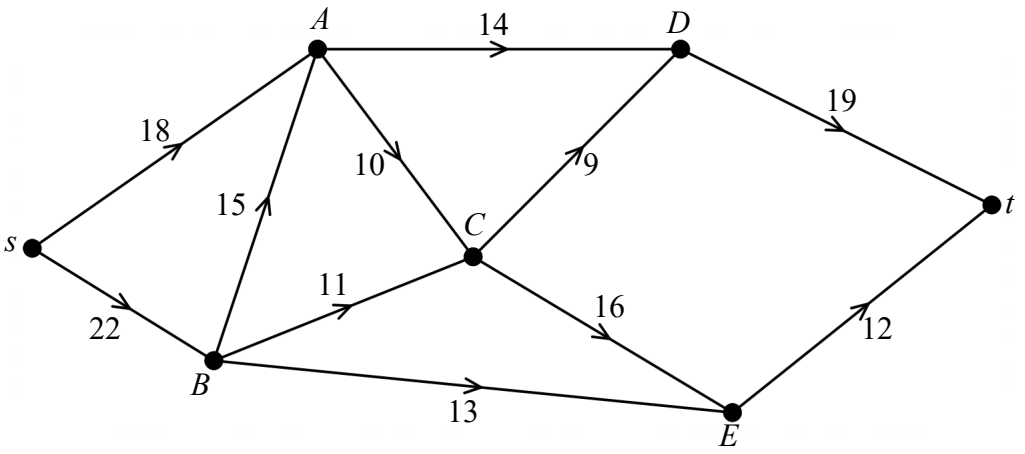
René organises a dance party. The number of attendees is inversely related to the ticket price to attend. **2**

There are 200 people who attend when the ticket price is $45.

Find how many will people attend the dance party if René decides to charge $50 for each ticket.

Question 37 (3 marks)

The network diagram below shows the maximum flow (measured in kL/min) of water through pipes in a network from a source (s) to a sink (t).



(a) Find the inflow of node C. **1**

.....

.....

.....

(b) On Monday the pipe from C to E was blocked. **2**

What impact did this have on the maximum flow of water from the source to the sink?

.....

.....

.....

.....

.....

.....

Question 38 (7 marks)

A table of present value interest factors for an annuity of $1 is shown.

Number of periods	*Interest rate per period*						
	0.5%	0.75%	1%	1.25%	1.5%	1.75%	2%
1	0.9950	0.9926	0.9901	0.9877	***A***	0.9828	0.9804
4	3.9704	3.9531	3.9418	3.9121	3.9132	3.8838	3.8539
12	11.7894	11.6921	11.5746	11.4371	11.3654	11.2097	10.9440
24	23.0914	22.7977	22.4869	22.1597	21.8147	21.4523	21.0729
36	34.2710	33.7325	33.1950	32.6577	32.1196	31.5801	31.0390
48	45.3292	44.5496	43.7761	42.9995	42.2193	41.4351	40.6466
60	56.2663	55.2491	54.2378	53.2323	52.2321	51.2369	50.2463

(a) Determine the value of ***A*** in the table, correct to 4 decimal places. **1**

(b) Harry borrows $45 000 to purchase a car with interest charged at 9% per annum compounding monthly. Harry agrees to repay the loan by making equal monthly repayments over a 4-year period. **2**

How much is Harry's monthly repayment?

Question 38 continues on page 45

Question 38 (continued)

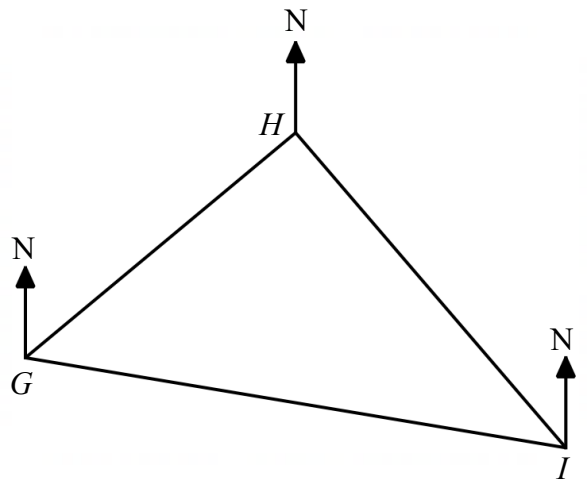
(c) Complete the table below by showing the missing values for Month 1 of Harry's reducible loan. **2**

Month	*Principal at start of month*	*Monthly interest*	*Monthly repayment*	*Balance at end of month*
1	\$45 000			

(d) Find the total amount of interest that Harry pays over the term of his loan. **2**

Question 39 (5 marks)

Matthew sailed 150 km from Gaussport (G) to Hamilton (H) on a bearing of 050° T. He then sailed on a bearing of $S50^\circ E$ to Isaacville (I) which is 300 km from Hamilton. **5**



NOT TO SCALE

Complete the diagram above, showing all the given information and use it to find the distance (to the nearest kilometre) and bearing (to the nearest degree) that Matthew will need to sail from Isaacville back to Gaussport.

End of Paper

Questions 36 – 39 Extra writing space
If you use this space, clearly indicate which question you are answering.

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SHORE

Set

Student Number

2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics Standard 2

General Instruction

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- Write using non-erasable black pen
- Calculators approved by NESA may be used
- A reference sheet is provided
- For questions in Section II, show relevant mathematical reasoning and/or calculations
- Write your Set and Student Number at the top of each booklet

Total marks: 100

Section I – 15 marks (pages 2–8)

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

Section II – 85 marks (pages 9–48)

- Attempt Questions 16–39
- Allow about 2 hours and 5 minutes for this section

DO NOT REMOVE THIS PAPER FROM THE EXAMINATION ROOM

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

Use the multiple-choice answer sheet for questions 1−15

---

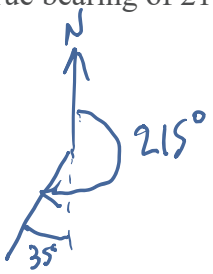
1 What compass bearing is equivalent to a true bearing of 215°?

A. S35°E

B. S55°E

C. S35°W

D. S55°W



2 Oliver bought a car for $40 000. Following straight line depreciation for 3 years, the car was worth $11 200.

What was the annual amount of depreciation for Oliver's car?

A. $3733

B. $9600

C. $17 067

D. $28 800

$$\text{Dep} = \frac{40\,000 - 11\,200}{3}$$
$$= \$9600$$

3 A network diagram with 9 vertices has 14 edges.

How many edges must be removed to leave a minimum spanning tree?

A. 5

B. 6

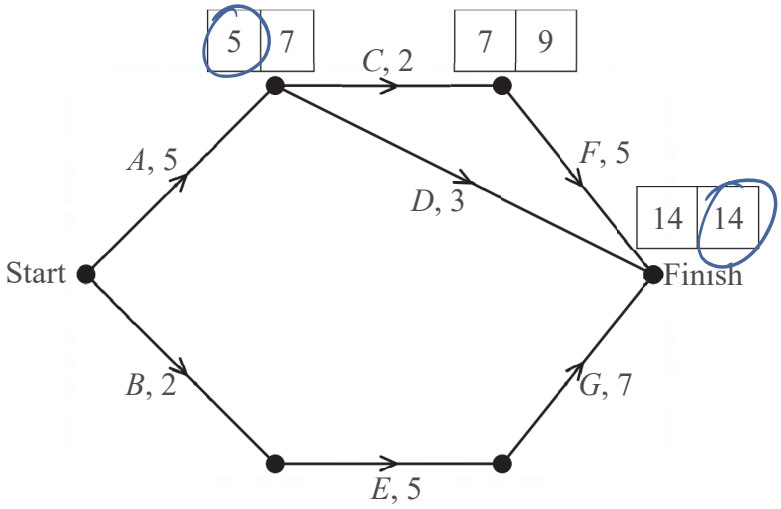
C. 8

D. 9

9 − 1 = 8 edges

14 − 8 = 6 removed

4 The network diagram below shows all of the activities involved in the completion of a project, along with the earliest start time and latest start time, in hours, for some of the activities involved.



What is the float time for activity *D*?

$14 - 5 - 3 = 6$

A. 2 hours

B. 4 hours

C. 5 hours

D. 6 hours

5 In a class at Oldington Grammar the ratio of boys to girls is 5 : 4.
On Tuesday, 6 girls were absent from class and the ratio of boys to girls was 5 : 2.

How many boys are in the class?

5 : 4
5 : 2
−2 parts = −6 girls

2 parts = 6 girls
1 part = 3 girls
5 parts = 15 boys

A. 12

B. 15

C. 27

D. 30

6 The score of 55 would be considered an outlier in the data set with which five-number summary?

A. 24, 25, 38, 43, 55

B. 24, 36, 38, 47, 59

C. 55, 60, 65, 83, 97

D. 53, 62, 65, 66, 85

Boundary = LQ − IQR × 1·5
= 62 − (66−62) × 1·5
= 56

55 < 56

7 Benjamin is charged 31.9 cents per kWh for energy usage.

How much will Benjamin pay to use a 200 watt television for 2 hours every day for one year?

A. $23.29

B. $46.57

C. $127.60

D. $146.00

$200 \div 1000 \times 2 \times 365 \times 0.319 = 46.574$

8 Brodie is in Sydney $(39^\circ\text{S}, 151^\circ\text{E})$ and his friend Aly is in Kaedi $(16^\circ\text{N}, 14^\circ\text{W})$.

Brodie calls Aly at 8 am Monday, Sydney time.

Using the difference in longitude, approximately what time did Aly receive the call?

A. 9 pm Sunday

B. 11 pm Sunday

C. 5 pm Monday

D. 7 pm Monday

$151 + 14 = 165^\circ$

$165 \div 15 = 11$ hours

K ← 11h — S

Ahead

8am Mon

8 am Mon − 11 hours = 9pm Sun

9 Byron owns 50 shares in Sure Education Inc. He purchased them for ~~$2~~ each. When they were each worth $4.20. Byron received a total dividend of $10.50.

What was the dividend yield of Byron's shares?

A. 5.0%

B. 10.5%

C. $0.21

D. $2.41

Using per share method

$10.50 \div 50 = \$0.21$

$DY = \frac{0.21}{4.20} \times 100\%$

$= 5\%$

Using total method

$50 \times 4.20 = 210$

$DY = \frac{10.50}{210} \times 100\%$

$= 5\%$

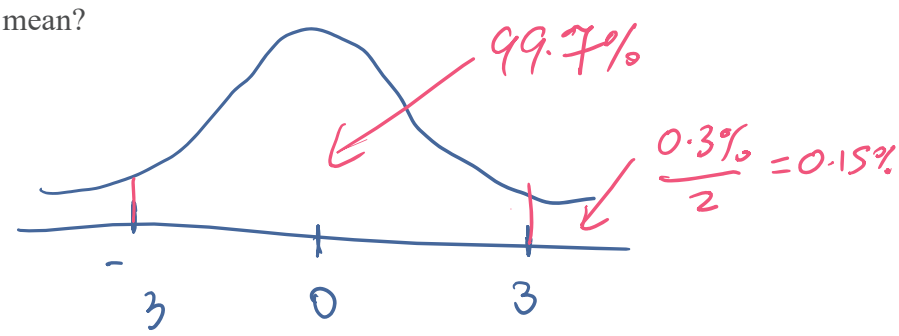
10 In a normally distributed set of data, what percentage of the scores are more than 3 standard deviations above the mean?

A. 0.15%

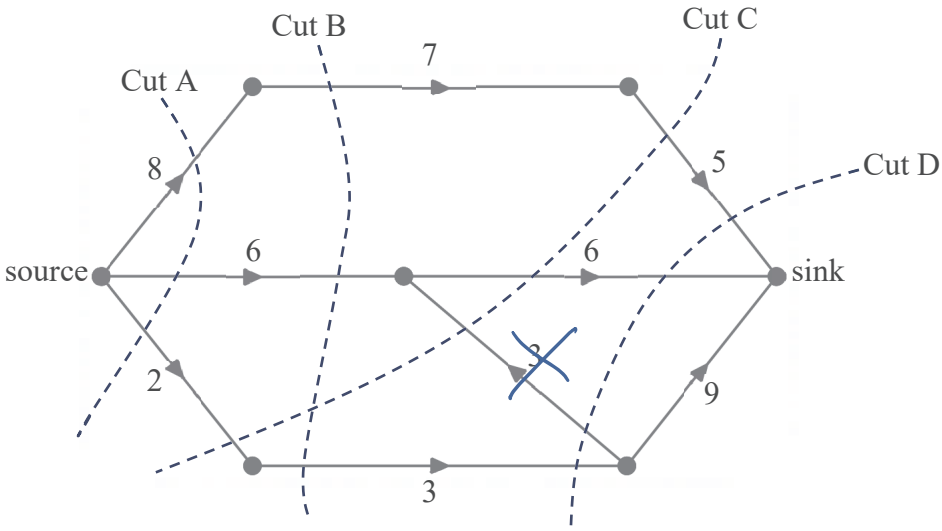
B. 0.30%

C. 2.50%

D. 5.00%



11 Consider the network shown below.



Which of the cuts shown could be used to find the maximum flow from source to sink?

A. Cut A $8+6+2=16$

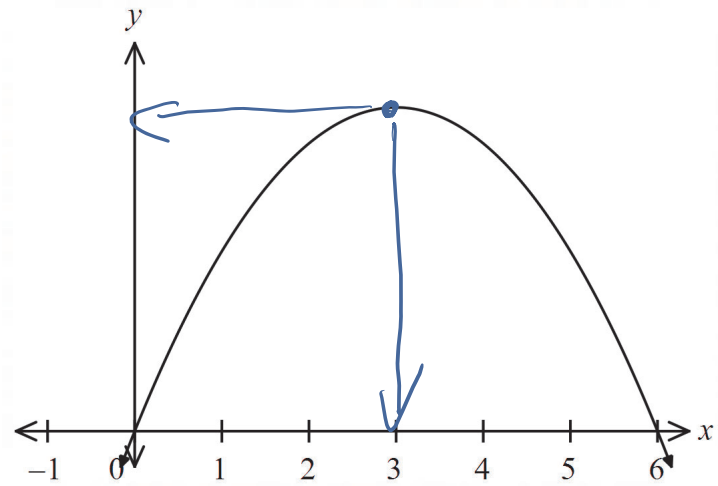
B. Cut B $7+6+3=16$

C. Cut C $5+6+2=13$

D. Cut D $5+6+3=14$

12 The height (h metres) of a rugby ball t seconds after Jake kicks it is given by $h = -5t(t-6)$.

The graph of $y = -5x(x-6)$ is shown below.



What is the maximum height of the ball Jake kicked and when does it occur?

A. 30 metres after 3 seconds

B. 45 metres after 3 seconds

C. 30 metres after 6 seconds

D. 45 metres after 6 seconds

max when $t = 3$

$h = -5 \times 3(3-6)$

$= 45$

13 The braking distance in metres of a car is given by $d = \dfrac{s^2}{250f}$ where s is the speed of the car in km/h when the brakes are applied, and f is the coefficient of friction.

The coefficient of friction is:

- 0.1 on ice roads
- 0.4 on wet roads
- 0.7 on dry roads

Ayrton is driving at 60 km/h during rain when he sees an obstacle up ahead. He takes 0.8 seconds to react and then applies the brakes.

Which of the following would be closest to the stopping distance of Ayrton's car?

A. 29 metres

B. 36 metres

C. 49 metres

D. 53 metres

$d = \dfrac{60^2}{250 \times 0.4}$

$= 36$

$SD = 36 + 60 \times 1000 \div 3600 \times 0.8$

$= 49.33\ldots$

14 Ed deposits contributions of \$1000 at the end of each month into an account that initially had \$2000 in it. The account pays interest of 12% per annum, compounded monthly.

Which of the following recurrence relations could model the value of Ed's annuity after n contributions?

$12\% \div 12 = 1\%$
$= 0.01$

A. $A_0 = 1000$, $A_n = 1.12 \times A_{n-1} + 2000$

B. $A_0 = 2000$, $A_n = 1.12 \times A_{n-1} + 1000$

C. $A_0 = 1000$, $A_n = 1.01 \times A_{n-1} + 2000$

D. $A_0 = 2000$, $A_n = 1.01 \times A_{n-1} + 1000$

15 The IQs of Year 12 Shaw School students are normally distributed with mean μ and standard deviation σ.

For this group, 16% of IQ scores are below 96 and 2.5% of the scores are above 132.

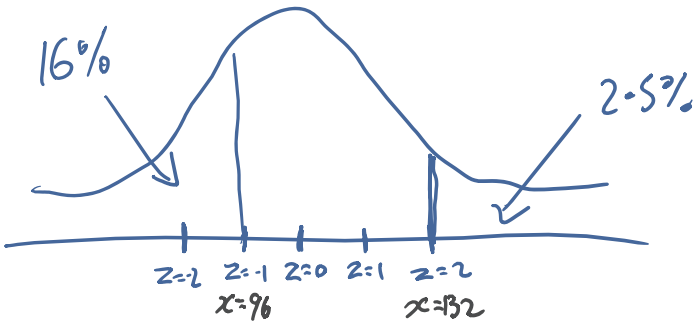
Which of the following is true of these IQ scores?

A. $\mu = 108$, $\sigma = 12$

B. $\mu = 108$, $\sigma = 18$

C. $\mu = 112$, $\sigma = 12$

D. $\mu = 112$, $\sigma = 18$



$3\sigma = 132 - 96$
$= 36$
$\sigma = 12$

$\mu = 96 + 12$
$= 108$

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet

A

Section II

85 marks
Attempt Questions 16-39
Allow about 2 hours 5 minutes for this section

Booklet A — Attempt Questions 16-22 (17 marks)
Booklet B — Attempt Questions 23-26 (17 marks)
Booklet C — Attempt Questions 27-31 (17 marks)
Booklet D — Attempt Questions 32-35 (17 marks)
Booklet E — Attempt Questions 36-39 (17 marks)

Instructions

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

Please turn over

Section II

85 marks
Attempt Questions 16–39
Allow about 2 hours and 5 minutes for this section

Answer the questions in the spaces provided.

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

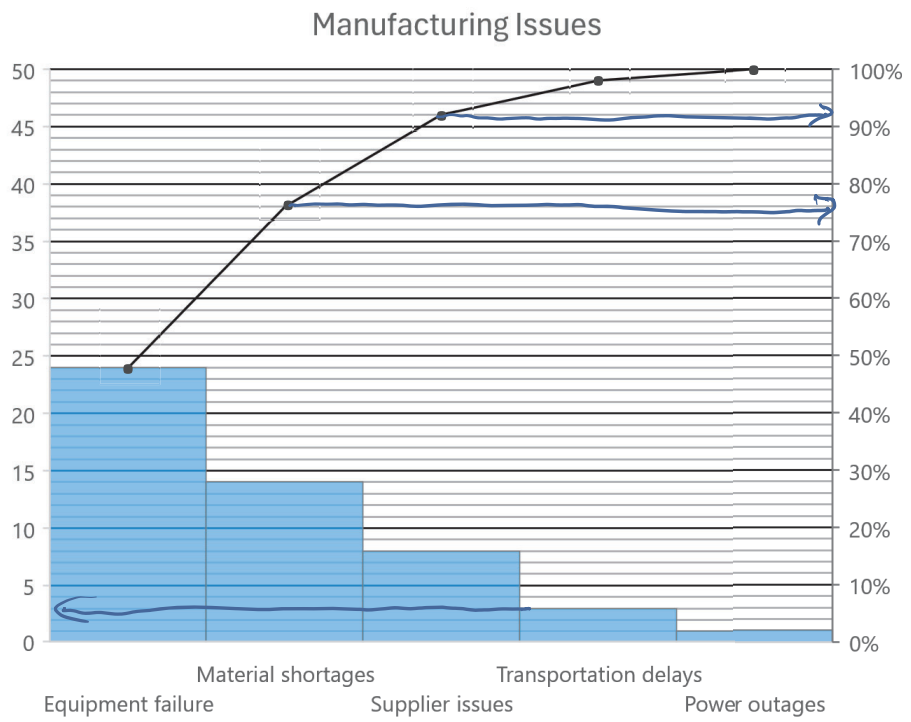
Extra writing space is provided at the end of each question booklet. If you use this space, clearly indicate which question you are answering.

Assume 52 weeks in a year, and 365 days in a year where necessary.

Booklet A: Questions 16 – 22 (17 marks)

Question 16 (2 marks)

The Pareto chart shown below shows the manufacturing issues in a factory last year.



(a) How many of the manufacturing issues were caused by "Transportation delays"? **1**

3

(b) What percentage of the manufacturing issues were caused by "Supplier issues"? **1**

92 − 76 = 16%

Question 17 (1 mark)

Werner drove 420 kilometres in his hybrid car and had fuel consumption for the trip of 4.7 L / 100 km. **1**

How many litres of fuel did Werner use on this trip?

Fuel = 420 ÷ 100 × 4.7
= 19.74 L

Question 18 (2 marks)

The annual income earned by a married couple Bob and Janice is in the ratio 3 : 5. **2**

If Bob earns $112 500 per year, find the total income earned by the couple.

3 parts = $112 500 ÷ 3
1 part = $37 500 × 8
8 parts = $300 000

∴ total income is $300 000

Question 19 (2 marks)

Sean invested \$5000 for 6 years at 5.4% per annum, compounded annually. **2**

Show that the equivalent simple annual interest rate to produce the same return as Sean's investment is approximately 6.18% per annum.

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

$FV = 5000(1+5.4\%)^6$

$= \$6855.0980\ldots$

$I = 6855.0980\ldots - 5000$

$= \$1855.0980\ldots$

$I = PRN$

$\frac{1855.0980\ldots}{5000 \times 6} = \frac{\cancel{5000} \times R \times \cancel{6}}{\cancel{5000} \times \cancel{6}}$

$R = 0.061836\ldots$

$\approx 6.1836\ldots$

$\doteqdot 6.18\%$ p.a.

Question 20 (2 marks)

$3\times \quad \cancel{3\times} \quad 3\times$

Solve the equation $5-\frac{x}{\cancel{3}}=2x$. **2**

$15-\cancel{x}=6x$

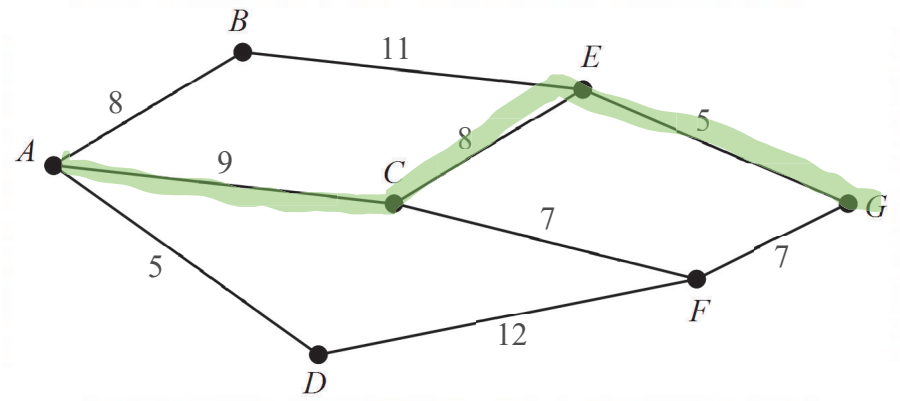
$+\cancel{x} \qquad +x$

$\frac{15}{7}=\frac{\cancel{7}x}{\cancel{7}}$

$x=\frac{15}{7}$

Question 21 (2 marks)

Nick wants to travel from town A to town G to visit Angus on the network shown below. **2**
The network diagram below shows distances between towns A to G in kilometres.



Find the shortest path Nick can take to visit Angus and its distance.

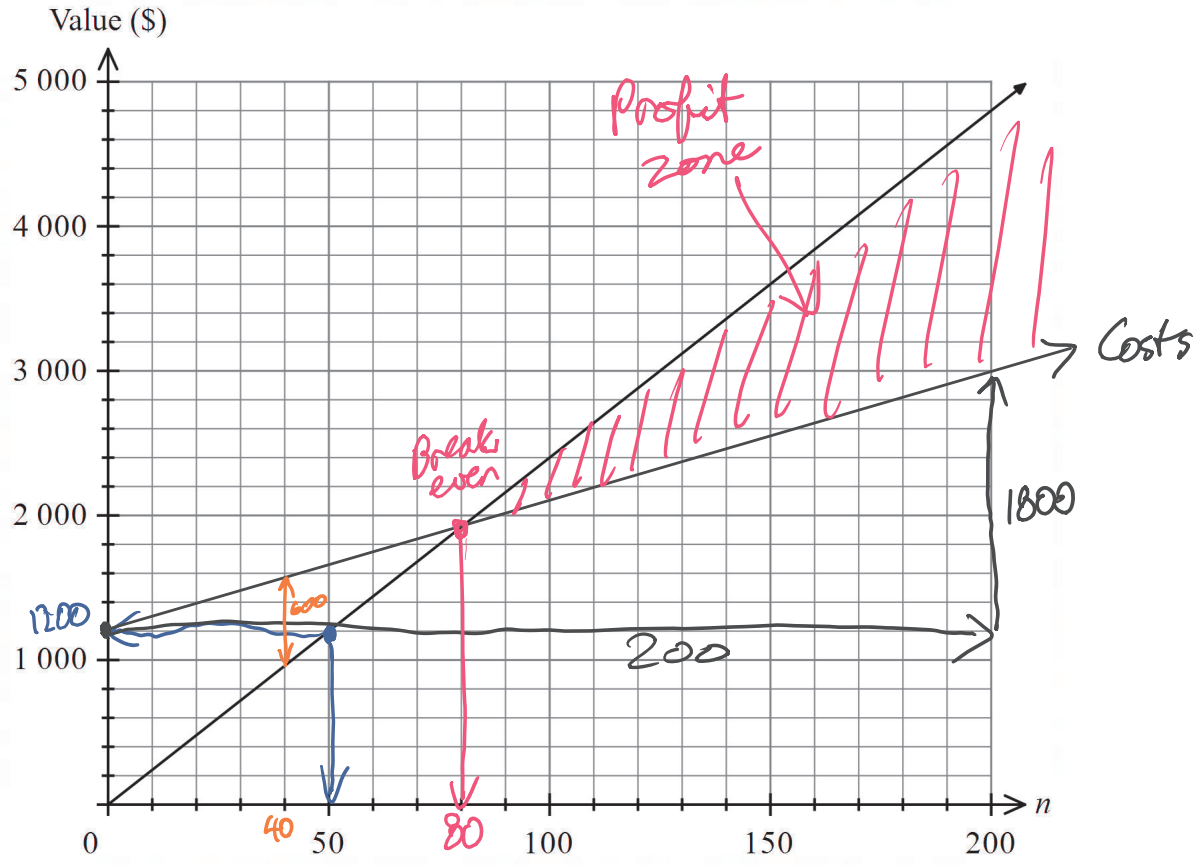
ACEG = 9+8+5
= 22 km

Question 22 (6 marks)

Tom runs his own business; Tom's Trinkets.

Each trinket is sold for the same fixed price.

The weekly income for the business for selling n trinkets is sketched on the graph below.



(a) Find the selling price of each trinket. **1**

Price $= \frac{1200}{50}$

$= \$24$/trinket

(b) Each week, Tom has fixed costs of $1200 and production costs of $9 per trinket. **2**

Complete the cost ($) equation below and **use it to sketch** Tom's costs on the axes above.

$C = 9n + 1200$

$m = 9$

$= \frac{9}{1} \times \frac{200}{200}$

$= \frac{1800}{200}$ ← rise ← run

Question 22 continues on page 15

Question 22 (continued)

(c) How many trinkets must Tom sell to break even? **1**

80 trinkets (by graph)

OR Income = Costs

$24n = 9n + 1200$

$15n = 1200 \rightarrow n = 800$

(d) Shade the 'profit zone' on the graph. **1**

(e) Last week, Tom unfortunately made a loss of \$600. **1**

How many trinkets did Tom sell last week?

Costs − Income = 600 (or by graph)

$9n + 1200 - 24n = 600$

$-15n = -600$

$n = 40$ trinkets

End of Question 22

End of Booklet A

Questions 16 – 22 Extra writing space
If you use this space, clearly indicate which question you are answering.

2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet B

Booklet B — Attempt Questions 23-26 (17 marks)

Instructions

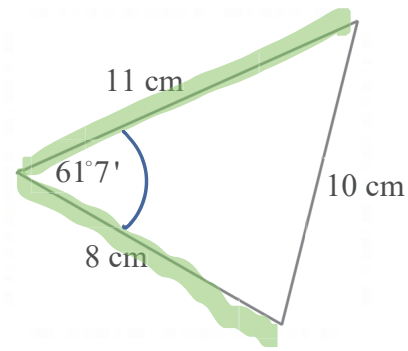
- Write your Examination Number and Set at the top of this page.
- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Your responses should include relevant mathematical reasoning and/or calculations.
- Extra writing space is provided on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

Please turn over

Booklet B: Questions 23 – 26 (17 marks)

Question 23 (2 marks)

The diagram shows a triangle with side lengths 8 cm, 10 cm and 11 cm. **2**



NOT TO SCALE

Find the area of the triangle, leaving your answer correct to the nearest square centimetre.

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

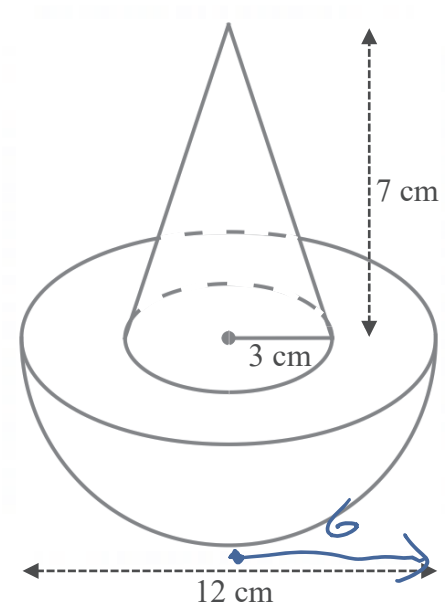
$= \frac{1}{2} \times 11 \times 8 \times \sin 61°7'$

$= 38.5266\ldots$

$\doteqdot 39\ cm^2$

Question 24 (4 marks)

An ornamental spinner is formed by joining a hemisphere to a cone with measurements as shown below. **4**



NOT TO SCALE

Find the total volume of the spinner, leaving your answer correct to 3 significant figures.

$V = \frac{1}{2} \times \frac{4}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$

$V = \frac{1}{2} \times \frac{4}{3} \times \pi \times 6^3 + \frac{1}{3} \times \pi \times 3^2 \times 7$

$= 518.3627...$

$\doteqdot 518 \text{ cm}^3$

Question 25 (5 marks)

The equation for trapezoidal rule is $A \approx \frac{h}{2}\left(d_f + d_l\right)$.

(a) Express d_f as the subject of the equation. **2**

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

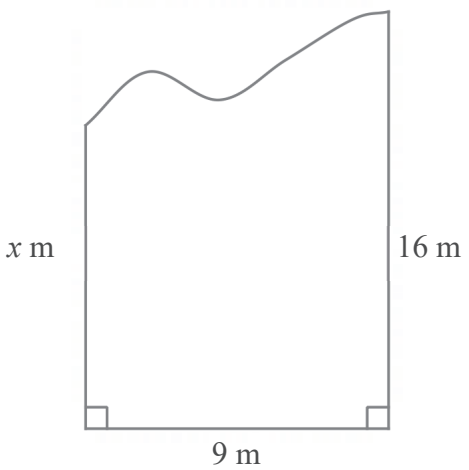
$2A = h(d_f + d_l)$ $\div h$

$\frac{2A}{h} = d_f + d_l$ $-d_l$

$\frac{2A}{h} - d_l = d_f$

$\therefore d_f = \frac{2A}{h} - d_l$

(b) Consider the block of land in the diagram below. Using the trapezoidal rule, the area of this block of land is approximately 126 m^2. **1**



NOT TO SCALE

Find the value of x.

Using $d_f = \frac{2A}{h} - d_l$

$x = \frac{2 \times 126}{9} - 16$

$x = 12$

Question 25 continues on page 21

Question 25 (continued)

(c) Last night 35 mm of rain fell across the whole region containing this block of land. Find the total volume of rain that fell on the block last night in kilolitres. **2**

$35 \div 1000 = 0.035$ m

$V = Ah$

$V = 126 \times 0.035$

$= 4.41$ m^3

$= 4.41$ kL

Question 26 (6 marks)

The table shows the future values of an annuity of $1.

Periods	Interest rate per period				
	2.0%	**2.5%**	**3.0%**	**3.5%**	**4.0%**
4	4.1216	4.2853	4.1836	4.2149	4.2465
5	5.2040	5.2563	5.3091	5.3625	5.4163
6	6.3081	6.3877	6.4684	6.5502	6.6330
7	7.4343	7.5474	7.6625	7.7794	7.8983
8	8.5830	8.7361	8.8923	9.0517	9.2142
9	9.7546	9.9545	~~10.1591~~	10.3685	10.5828
10	10.9497	11.2034	11.4639	11.7314	12.0061

Two friends devised savings plans so that they could go on a holiday together after finishing university.

(a) Max contributed $500 at the end of every six months into a high interest account paying 6% interest per annum, compounded six-monthly. **2**

If Max sticks to his plan, find how much his investment will be worth in 4 years.

$6\% \div 2 = 3\%$

$4 \times 2 = 8$

$FV = a \times FVIF$

$FV = 500 \times 8.8923$

$= \$4446.15$

(b) Max's friend Josh made sure he had the same amount saved in the 4 years by investing a single amount at the start. **2**

What single amount did Josh invest at the same rate and compounding period to produce the same return over the 4 years?

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

$\frac{4446.15}{(1+3\%)^8} = \frac{PV\cancel{(1+3\%)^8}}{\cancel{(1+3\%)^8}}$

$PV = 3509.83186\ldots$

$\doteqdot \$3509.83$ (or $3509.84)

Question 26 continues on page 23

Question 26 (continued)

(c) Find how much more interest was earned by Josh than Max in the 4 years. **2**

Same FV

Max put in $500 \times 8 = \$4000$

Josh put in $\$3509.83$

$\therefore$ Additional interest $= 4000 - 3509.83$

$= \$490.17$

End of Booklet B

Questions 23 – 26 Extra writing space

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

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet C

Booklet C — Attempt Questions 27-31 (17 marks)

Instructions

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

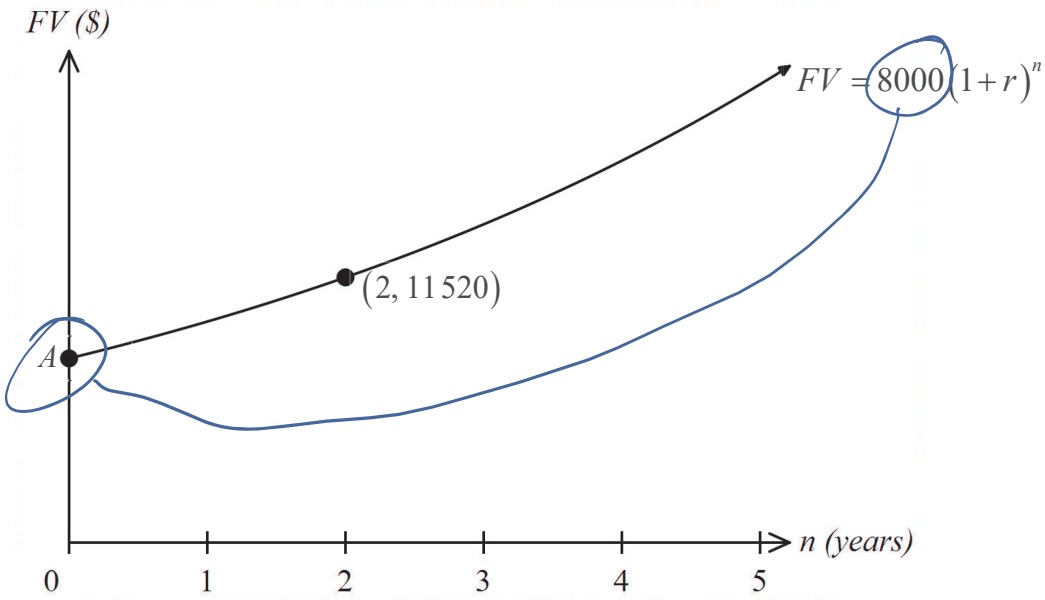
Please turn over

Booklet C: Questions 27 – 31 (17 marks)

Question 27 (4 marks)

The value of one of Warren's investments is growing exponentially according to the formula $FV = 8000(1+r)^n$, where r is the percentage growth rate and n is the number of years after 1st January 2020. On 1st January 2022, the investment was worth \$11 520.

The incomplete graph of Warren's investment is shown below.



(a) State the value of A, the vertical intercept of the graph. **1**

$A = 8000$

(b) Find the value of r, leaving your answer as a percentage. **2**

$FV = 8000(1+r)^n$ when $n=2$, $FV = 11520$

$11520 = 8000(1+r)$ $\div 8000$

$1.44 = (1+r)^2$

$1.2 = 1+r$

$r = 0.2$

$= 20\%$

(c) Find the value of the investment on 1st January 2026 if it continues to grow at the same rate. **1**

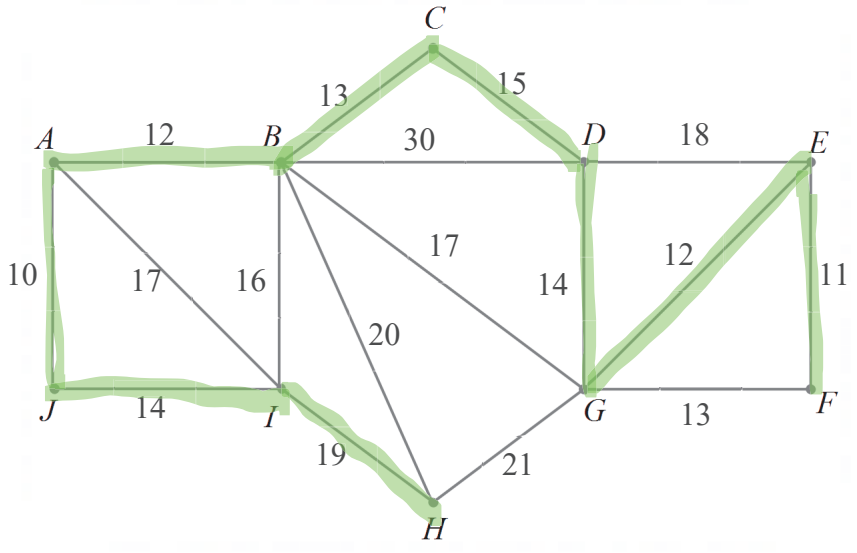
When $n = 4$

$FV = 8000(1+20\%)^4$

$= \$16588.80$

Question 28 (3 marks)

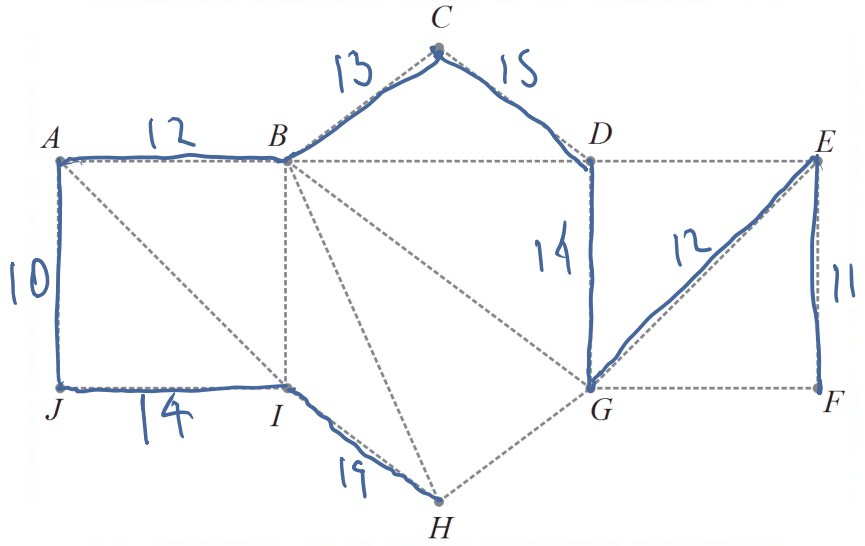
Alex is opening a fun fair with rides A to J as shown in the network diagram below.



NOT TO SCALE

The edge lengths shown represent the lengths in metres of the paths between the rides.

(a) On the diagram below, complete the minimum spanning tree and state the minimum total length of paths to keep every ride connected. **2**



Length = 120 m

(b) Alex is given a quote of \$4600 to concrete the paths in this minimum spanning tree. **1**

Find the cost per metre being charged for the paths.

Rate = 4600 ÷ 120

= \$38.33 / m

Question 29 (3 marks)

The first table below shows the income tax rates for the 2023-2024 financial year. The tax rates for the 2024-2025 financial year are also shown. The brackets and rates were changed in 2024-2025 to give a 'tax cut' to most taxpayers. **3**

Tax Rates 2023-2024

Taxable income	**Tax on this income**
0 – $18,200	Nil
$18,201 – $45,000	19c for each $1 over $18,200
$45,001 – $120,000	$5,092 plus 32.5c for each $1 over $45,000
$120,001 – $180,000	$29,467 plus 37c for each $1 over $120,000
$180,001 and over	$51,667 plus 45c for each $1 over $180,000

Tax Rates 2024-2025

Taxable income	**Tax on this income**
0 – $18,200	Nil
$18,201 – $45,000	16c for each $1 over $18,200
$45,001 – $135,000	$4,288 plus 30c for each $1 over $45,000
$135,001 – $190,000	$31,288 plus 37c for each $1 over $135,000
$190,001 and over	$51,638 plus 45c for each $1 over $190,000

Stef had a taxable income of $153 000 in financial year 2023-2024 and the same taxable income in 2024-2025. Find the size of Stef's 'tax cut' for the financial year 2024-2025.

$Tax_1 = 29467 + 0.37(153000 - 120000)$
$= \$41677$

$Tax_2 = 31288 + 0.37(153000 - 135000)$
$= \$37948$

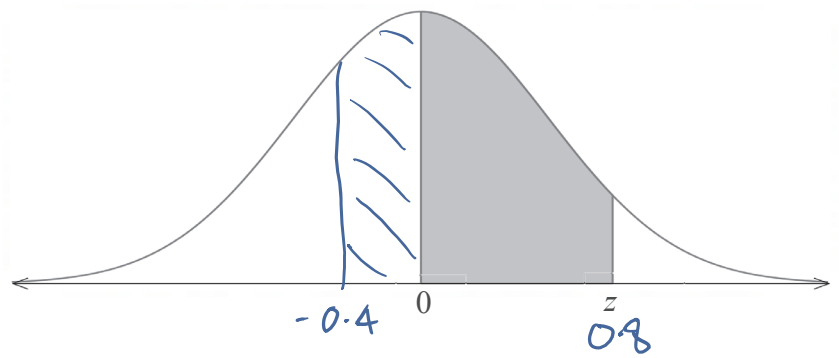
Tax Cut $= 41677 - 37948$
$= \$3729$

Question 30 (4 marks)

A random variable is normally distributed with mean 0 and standard deviation 1. The table gives the probability that this random variable lies between 0 and z for different values of z.

z	0.2	0.4	0.6	0.8	1.0
Probability	0.0793	0.1554	0.2258	0.2881	0.3413

The probability values given in the table for different values of z are represented by the shaded area in the following diagram.



(a) German Short-haired Pointers (GSP's) have mean life expectancy of $\mu = 13$ years, and standard deviation $\sigma = 2.5$ years. **1**

Find the z-score for a GSP that lives 15 years.

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

$$z = \frac{15-13}{2.5}$$

$$= 0.8$$

(b) Andrew owns a GSP. **3**

What is the probability that Andrew's GSP lives to between 12 and 15 years of age?

$$z_2 = \frac{12-13}{2.5}$$

$$= -0.4$$

$$P(12 \text{ to } 15) = 0.1554 + 0.2881$$

$$= 0.4435$$

Question 31 (3 marks)

James used his credit card on 12th August to purchase a new suit for \$750. **3**

On 23rd August he repaid \$300.

A statement for the credit card was issued on the last day of August.

The statement for August showed that interest was charged at 0.0383% per day, compounded daily, from (and including) the date of purchase up to (and including) the date of payment.

Calculate the remaining amount for James to pay on the last day of August so that the card is paid off in full (\$0 balance).

$23-12+1 = 12$ days

$31-24+1 = 8$ days

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

$FV_1 = 750(1+0.0383\%)^{12}$

$= \$753.4542\ldots$

$753.4542\ldots - 300 = \$453.4542\ldots$

$FV_2 = 453.4542\ldots(1+0.0383\%)^8$

$= 454.8455\ldots$

$\doteqdot \$454.85$

End of Booklet C

Questions 27 – 31 Extra writing space
If you use this space, clearly indicate which question you are answering.

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet D

Booklet D — Attempt Questions 32-35 (17 marks)

Instructions

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

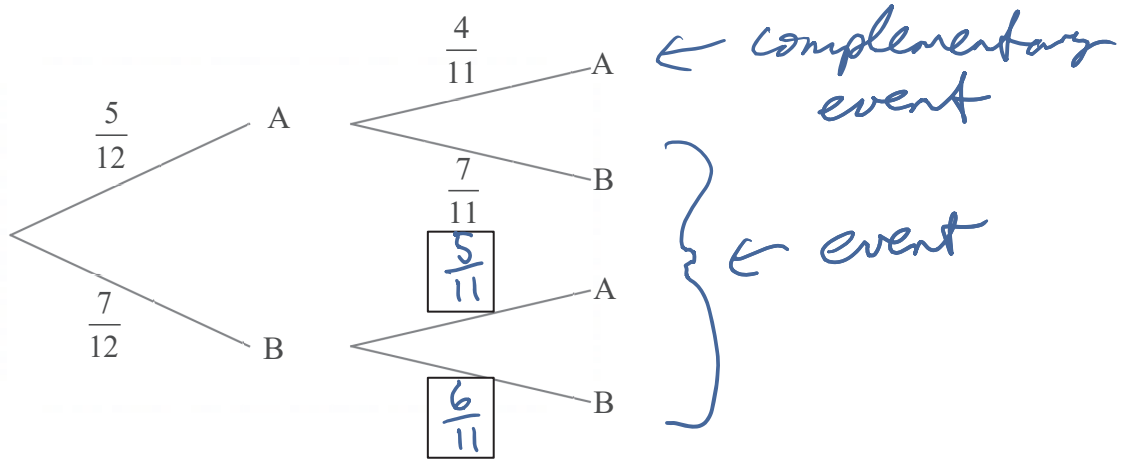
Please turn over

Booklet D: Questions 32 – 34 (17 marks)

Question 32 (2 marks)

In a bag are 5 aqua marbles and 7 black marbles. **2**
Two marbles are simultaneously selected from the bag at random.

Complete the probability tree below and use it to find the probability of at least one of the two selected marbles being black.

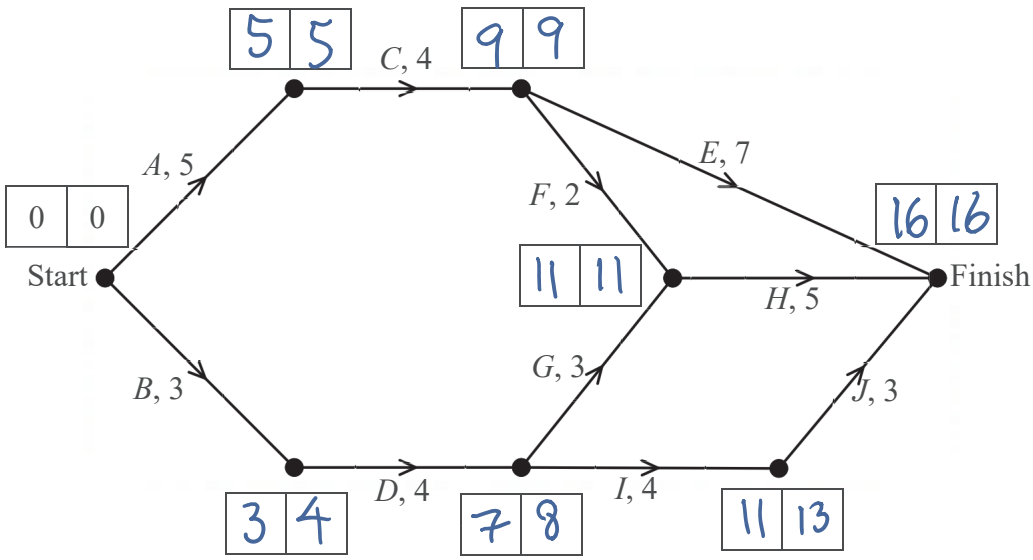


$p = 1 - \frac{5}{12} \times \frac{4}{11}$

$= \frac{28}{33}$

Question 33 (5 marks)

Activities A to J are part of the set-up of a campsite by a group of campers. The network diagram below shows these activities and their completion time in minutes.



(a) Complete a forward and backward scan on the network diagram, showing the EST and LST at each vertex. **2**

(b) State the critical path(s). **1**

ACE & ACFH

(c) A helpful stranger at the campsite is willing to help these campers complete one of the activities. The stranger's help will save 2 minutes on this activity. **2**

Find an activity that the helpful stranger could complete to save time for the set-up of the campsite and how much time it would save the group overall.

A or C would save 1 minute

(common on the critical paths) (other activities only have a float of 1 min)

Question 34 (8 marks)

'Life expectancy' measures how long, on average, a person is expected to live from the time they are born.
The following table shows the life expectancy of Australian females.

Year of birth (n)	1900	1920	1940	1960	1980	2000	2020
Life expectancy (L years)	54.8	63.3	66.2	74.2	78.5	82.6	85.3

(a) Find the value of the correlation coefficient correct to 3 decimal places and hence describe the strength and nature of the relationship between the variables. **2**

$r = 0.9883...$
$\doteqdot 0.988$ strong positive correlation

(b) Use your calculator to find the equation of the least squares regression line, writing each value correct to 3 decimal places. **2**

$A = -426.2714...$ $B = 0.2542...$
$\doteqdot -426.271$ $\doteqdot 0.254$
$(A + Bx)$
$\therefore L = -426.271 + 0.254n$

(c) Use your equation to predict the year of birth when the life expectancy of Australian females will first reach 100 years. **1**

$100 = -426.271 + 0.254n$
$+426.271 \quad + 426.271$
$\frac{526.271}{0.254} = \frac{0.254n}{0.254}$
$n = 2071.933...$
$\therefore$ during 2071

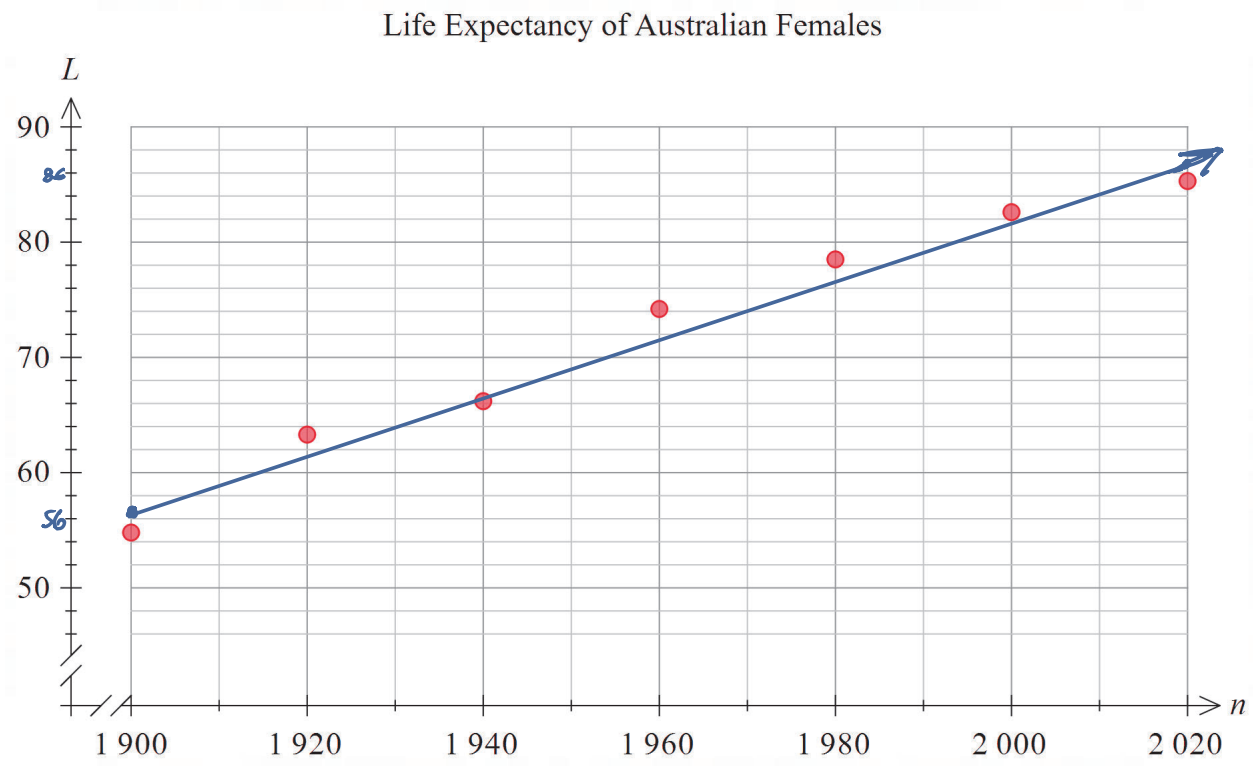
Question 34 continues on page 37

Question 34 (continued)

(d) Explain why you might not be confident in the life expectancy of Australian females actually reaching 100 years in your answer to part (c). **1**

It is extrapolation well beyond the data set

(e) The data has been plotted on the graph below. **2**



Sketch the line with the equation you found in part (b) on the graph above.

When $n = 1900$

$L = -426.271 + 0.254 \times 1900$

≈ 56.329

When $n = 2020$

$L = -426.271 + 0.254 \times 2020$

$= 86.809$

Question 35 (2 marks)

Harrison is studying a population of lizards in a grassland and used the capture-recapture technique to estimate the size of the population. He initially captured, tagged and released 40 of these lizards. **2**

A month later he again captured 40 lizards from the same grassland. He found that 5 of the first 15 lizards he examined from this second group were tagged.

How many of the remaining 25 lizards in the sample were tagged if Harrison's estimate for the lizard population in the grassland was 123 lizards?

$$\frac{\text{Pop total}}{\text{Pop tagged}} = \frac{\text{Sample total}}{\text{Sample tagged}}$$

$$\frac{123}{40} = \frac{40}{5+x} \quad \times 40 \times (5+x)$$

$$123(5+x) = 1600 \quad \div 123$$

$$5+x = 13.0081\ldots \quad -5$$

$$x = 8.0081\ldots$$

$\therefore$ 8 more lizards tagged

End of Booklet D

Questions 32 – 35 Extra writing space
If you use this space, clearly indicate which question you are answering.

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2024 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Set

Student Number

Mathematics Standard 2

Section II Answer Booklet

E

Booklet E — Attempt Questions 36-39 (17 marks)

Instructions

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

Please turn over

Booklet E: Questions 36 – 39 (17 marks)

Question 36 (2 marks)

René organises a dance party. The number of attendees is inversely related to the ticket price to attend. **2**

There are 200 people who attend when the ticket price is \$45.

Find how many will people attend the dance party if René decides to charge \$50 for each ticket.

$t = \frac{k}{a}$

When $t = 45$, $a = 200$

$45 = \frac{k}{200}$ $\times 200$

$k = 9000$

$\therefore \quad t = \frac{9000}{a}$

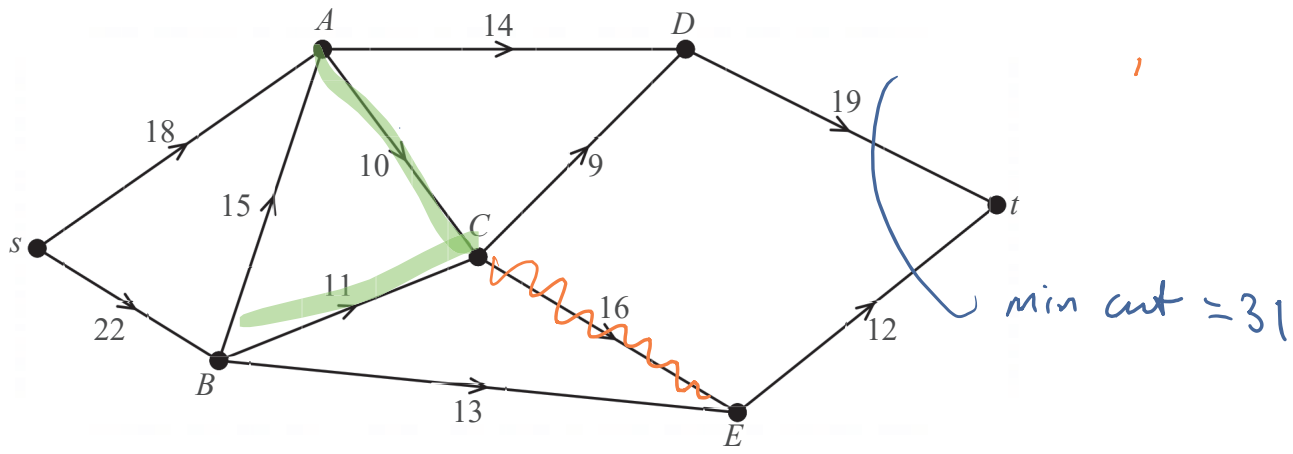
When $t = 50$

$50 = \frac{9000}{a}$ $\times a \div 50$

$a = 180$ people

Question 37 (3 marks)

The network diagram below shows the maximum flow (measured in kL/min) of water through pipes in a network from a source (s) to a sink (t).



(a) Find the inflow of node C. **1**

10 + 11 = 21 kL/min

(b) On Monday the pipe from C to E was blocked. **2**

What impact did this have on the maximum flow of water from the source to the sink?

The old max flow was 12 + 19 = 31 kL/min

The 16 is not on the minimum cut

∴ No change to the max flow.

Question 38 (7 marks)

A table of present value interest factors for an annuity of $1 is shown.

Number of periods	*Interest rate per period*						
	0.5%	0.75%	1%	1.25%	1.5%	1.75%	2%
1	0.9950	0.9926	0.9901	0.9877	***A***	0.9828	0.9804
4	3.9704	3.9531	3.9418	3.9121	3.9132	3.8838	3.8539
12	11.7894	11.6921	11.5746	11.4371	11.3654	11.2097	10.9440
24	23.0914	22.7977	22.4869	22.1597	21.8147	21.4523	21.0729
36	34.2710	33.7325	33.1950	32.6577	32.1196	31.5801	31.0390
48	45.3292	44.5496	43.7761	42.9995	42.2193	41.4351	40.6466
60	56.2663	55.2491	54.2378	53.2323	52.2321	51.2369	50.2463

(a) Determine the value of ***A*** in the table, correct to 4 decimal places. **1**

$PV = \frac{FV}{(1+r)^n}$ $PV = \frac{1}{(1+1.5\%)^1}$

$= 0.98522...$

$\doteqdot 0.9852$

(b) Harry borrows $45 000 to purchase a car with interest charged at 9% per annum compounding monthly. Harry agrees to repay the loan by making equal monthly repayments over a 4-year period. **2**

How much is Harry's monthly repayment?

$r = 9\% \div 12$ $n = 4 \times 12$

$= 0.75\%$ per month $= 48$ months

$PV = a \times PVIF$

$45000 = a \times 44.5496$ $\div 44.5496$

$a = 1010.110...$

$\doteqdot \$1010.11$ per month

Question 38 continues on page 45

Question 38 (continued)

(c) Complete the table below by showing the missing values for Month 1 of Harry's reducible loan. **2**

Month	*Principal at start of month*	*Monthly interest*	*Monthly repayment*	*Balance at end of month*
1	\$45 000	\$337.50	\$1010.11	\$44327.39

$0.75\% \times 45000 = \$337.50$

$45000 + 337.50 - 1010.11 = \$44\,327.39$

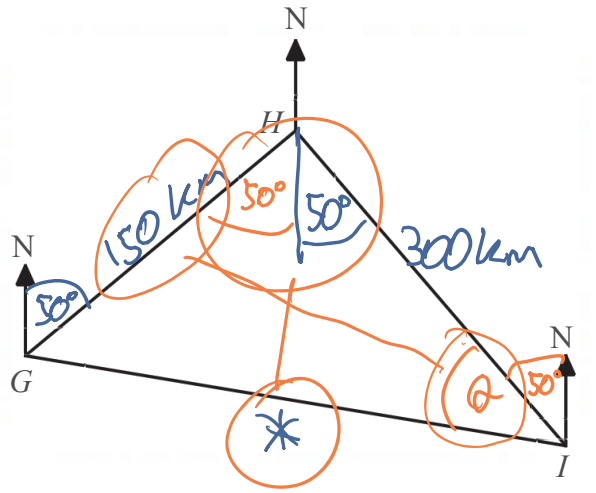
(d) Find the total amount of interest that Harry pays over the term of his loan. **2**

$I = 48 \times 1010.11 - 45000$

$= \$3485.28$

Question 39 (5 marks)

Matthew sailed 150 km from Gaussport (G) to Hamilton (H) on a bearing of 050°T. He then sailed on a bearing of S50°E to Isaacville (I) which is 300 km from Hamilton. **5**



NOT TO SCALE

Complete the diagram above, showing all the given information and use it to find the distance (to the nearest kilometre) and bearing (to the nearest degree) that Matthew will need to sail from Isaacville back to Gaussport.

$GI^2 = 150^2 + 300^2 - 2 \times 150 \times 300 \times \cos 100^\circ$

$GI = \sqrt{128128.336}$

$\approx 357.9501\ldots$

$\doteqdot 358$ km

$\frac{\sin\theta}{150} = \frac{\sin 100}{358}$

$\theta = \sin^{-1}\left(\frac{150 \sin 100}{358}\right)$

$= 24.370\ldots$

$\doteqdot 24^\circ$

$50 + 24 = 74^\circ$

$360 - 74 = 286^\circ$ T

😊 **End of Paper** 😊