Student Number | | | | | | | | | |

2022 Trial Examination

Manly Campus -
Northern Beaches Secondary College

Mathematics Standard 2

General Instructions

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

Total Marks: 100

Section I – 15 marks (pages 2 - 8)

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

Section II – 85 marks (pages 11 - 36)

- Attempt Questions 16 – 42
- Allow about 2 hours and 5 minutes for this section

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Section I

15 marks

Attempt Questions 1-15

Allow about 25 minutes for this section

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

1. What is $0.000\,028$ expressed in scientific notation?

   A. 2.8×10^{-5}

   B. 2.8×10^{5}

   C. 2.8×10^{-6}

   D. 28×10^{-5}

2. A number is increased by 5, then this amount is halved, to give a result of 13. Which of the following equations represents this information?

   A. $\frac{x}{2}+5=13$

   B. $2x+5=13$

   C. $2(x+5)=13$

   D. $\frac{x+5}{2}=13$

3. A tap is dripping at $5\,\text{mL}$ per minute. Which calculation would best approximate how many litres of water would fall in one week?

   A. $5\times 60\times 24\times 7\times 1000$

   B. $\dfrac{60\times 24\times 7}{5\times 1000}$

   C. $\dfrac{5\times 1000}{60\times 24\times 7}$

   D. $\dfrac{5\times 60\times 24\times 7}{1000}$

4. What is the gradient of the line with equation $4x-2y+5=0$?

   A. $-\dfrac{1}{2}$

   B. $\dfrac{1}{2}$

   C. 2

   D. 4

5. Sydney in New South Wales is 10 hours ahead of Coordinated Universal Time (UTC). Paris in France is 2 hours ahead of UTC.

   When it is 8 am in Paris, what time is it in Sydney?

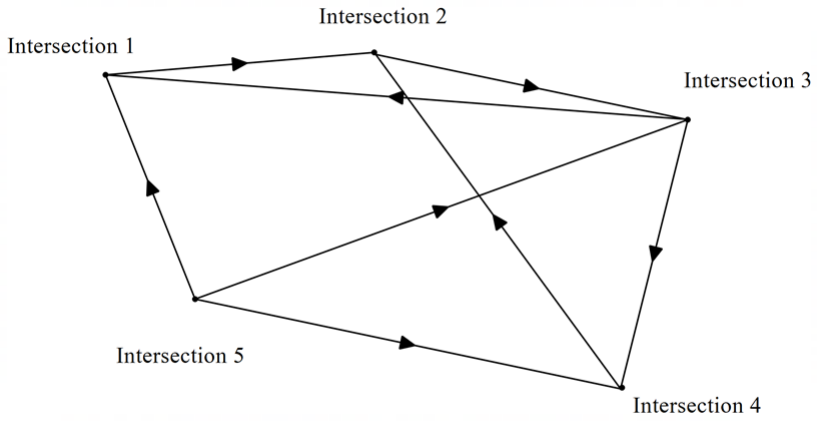
   A. 4 pm

   B. 12 pm

   C. 4 am

   D. 12 am

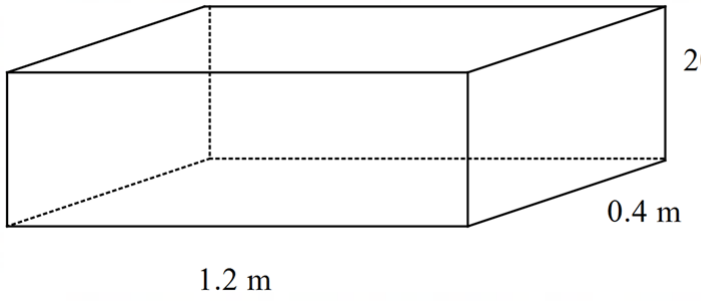
6. The directed graph below shows the direction of traffic flow through a network of one-way streets.



The directed graph shows that traffic can only move from Intersection 1 to?

A. Intersection 2
B. Intersections 2 and 3
C. Intersections 2, 3 and 4
D. Intersections 2, 3, 4 and 5

7. In cubic centimetres, what is the volume of the rectangular prism shown below?



NOT TO SCALE

A. 9.6 cm^3
B. 96 cm^3
C. 9600 cm^3
D. 96000 cm^3

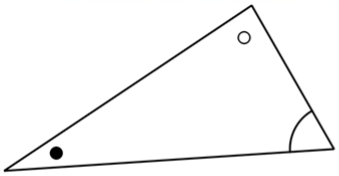
8. Ashley checks the weather app on her phone and sees that:

"It will likely rain this afternoon."

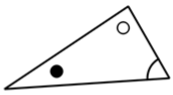
Which of the following best represents the probability of an event that will "likely occur"?

A. 25%
B. 50%
C. 75%
D. 100%

9. In the diagram below, the area of Triangle *A* is 4 times the area of Triangle *B*.



Triangle *A*



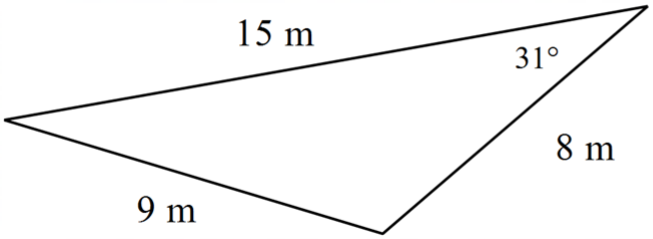
Triangle *B*

NOT TO SCALE

Which scale has been used to transform from Triangle *A* to Triangle *B*?

A. 1 : 2
B. 1 : 4
C. 2 : 1
D. 4 : 1

10. What is the area of this triangle, to the nearest square metre?



NOT TO SCALE

A. $19\,\text{m}^2$

B. $31\,\text{m}^2$

C. $38\,\text{m}^2$

D. $62\,\text{m}^2$

11. Which of the following correctly expresses b as the subject of $A = \frac{h}{2}(a+b)$?

A. $b = 2Ah - a$

B. $b = 2Ah + a$

C. $b = \frac{2A}{h} - a$

D. $b = \frac{2A}{h} + a$

12. Last year, Aston bought 300 shares at $\$8.20$ per share. He recently received a dividend of $\$0.22$ per share, which represented a dividend yield of 2.5%.

    What was the share price at the time the dividend was given?

    A. \$7.98

    B. \$8.42

    C. \$8.60

    D. \$8.80

13. The stem and leaf plot shown below represents the marks, as a percentage, achieved by a class on a recent test.

4	$\boxed{A}$	5	7	
5	1	7	8	9
6	6	8	8	
7	4	7	7	
8	3	5	$\boxed{B}$	

    If the range of the data set is 42, what is the largest possible value of B?

    A. 6

    B. 7

    C. 8

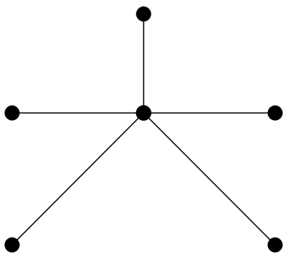
    D. 9

14. In a club meeting, 5 members and the club president are in attendance.

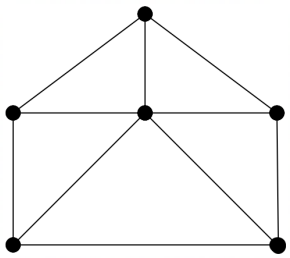
The club rules state that each regular member must shake the hand of two other members and the club president must shake everyone's hand.

Which network diagram can be used to represent the handshakes between group members?

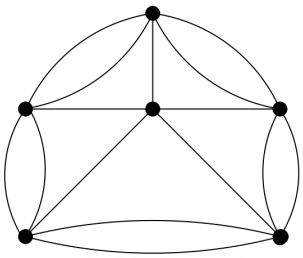
A.



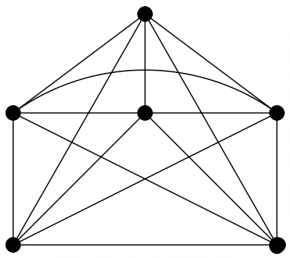
B.



C.



D.



15. Jackson spent $\$233$ when he bought x books and y comics.

The average book price was $\$18$ and the average comic price was $\$7$.

Which pair of simultaneous equations could be used to find how many of each he bought, if he bought 6 more books than comics?

A. $\begin{cases} 18x+7y=233 \\ y-x=6 \end{cases}$

B. $\begin{cases} 18x+7y=233 \\ x-y=6 \end{cases}$

C. $\begin{cases} \frac{x}{18}+\frac{y}{7}=233 \\ y-x=6 \end{cases}$

D. $\begin{cases} \frac{x}{18}+\frac{y}{7}=233 \\ x-y=6 \end{cases}$

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2022 Manly Campus - Student Number

Northern Beaches Secondary College

Mathematics Standard 2

Section II Answer Booklet 1

Section II

85 marks

Attempt All Questions – 16 to 41

Allow about 2 hours and 5 minutes for this section

Booklet 1 – Attempt Questions 16 to 30 (42 marks)

Booklet 2 – Attempt Questions 31 to 41 (43 marks)

Instructions

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

Question 16 (2 marks)

Kerryn borrowed $8 000, and repaid the loan in full 18 months later with a lump sum payment of $8 500.

Determine the annual simple rate of interest she was charged.

Give your answer as a percentage, correct to 2 decimal places.

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Question 17 (3 marks)

A new model washing machine has an energy consumption of 175 kWh per year, and uses an average of 9 900 L of water per year.

Energy is charged at $0.42/kWh and the cost of water supply is $2.35/kL.

What is the annual running cost of the washing machine?

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Question 18 (2 marks)

Interest on a particular credit card is charged at 0.052% compound interest per day, on the outstanding balances.

How much interest will be charged on $480, outstanding on the credit card for 21 days?

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Question 19 (2 marks)

A new car is bought for $48,000, and the straight-line method of depreciation is used each year, as shown in the table below.

End of year	1	2	3
Depreciated value	$45660	$43320	$40980

What is the depreciated value of the car at the end of the sixth (6^{th}) year?

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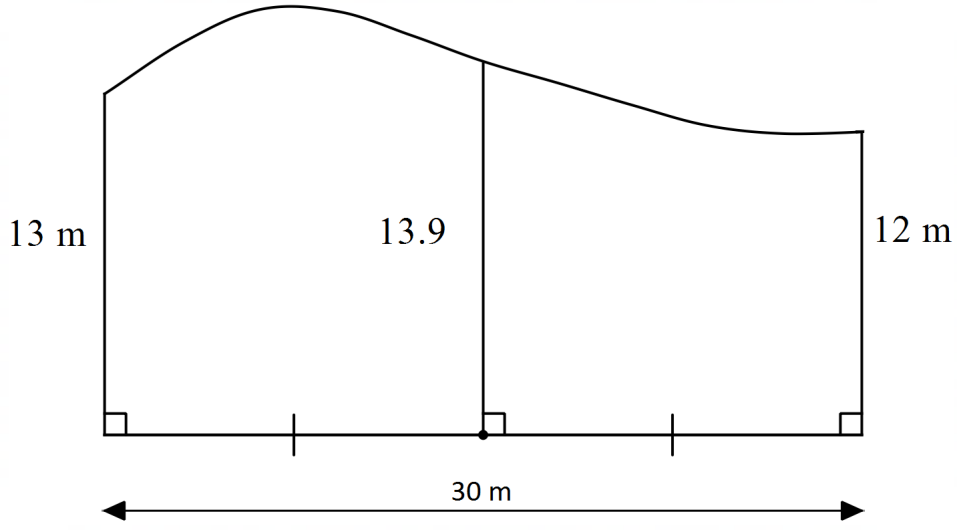
Question 20 (2 marks)

A park, which runs along a creek, has an irregular boundary line.



Use two applications of the Trapezoidal Rule to estimate the area of the park correct to the nearest square metre.

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Question 21 (3 marks)

Young's formula allows for the calculation of the dose of a medication to be given to a child, according to the formula:

$$\text{Dosage (mL) for children} = \frac{\text{age of child (in years)} \times \text{adult dosage}}{\text{age of child (in years)} + 12}$$

(a) An 8 year old child's dose is 6 mL. Find the adult dose. **2**

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(b) Would an 8 year old child receive double the dose that a 4 year old child requires? Give a reason(s) for your answer. **1**

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Question 22 (2 marks)

If $P = 3x + 12$ and x is decreased by 3, what will be the corresponding change in P?

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Question 23 (2 marks)

Workers at a factory were given a pay rise of either 3% or \$35 per week, whichever was larger.

Sarah earned \$1,300 before the rise and Sam earned \$980 before the rise.

What is the total of their pay rises?

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Question 24 (3 marks)

Solve the equation $x - \frac{x-2}{3} = 4$.

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Question 25 (2 marks)

The normal hourly rate of pay for a particular worker is $\$28$.

In one week, the worker earned time-and-a-half rates for 14 hours of overtime.

The following week, he earned the same amount of overtime pay, but only worked at double-time rates.

How many hours of overtime were worked in the second week?

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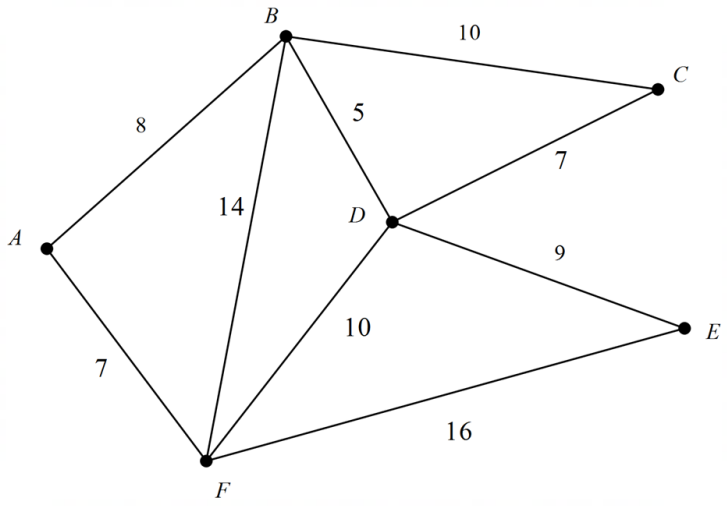
Question 26 (2 marks)

Consider the network diagram below.



Use an appropriate algorithm to show the minimum spanning tree on the network below.

Hence, find the minimum value of the spanning tree.

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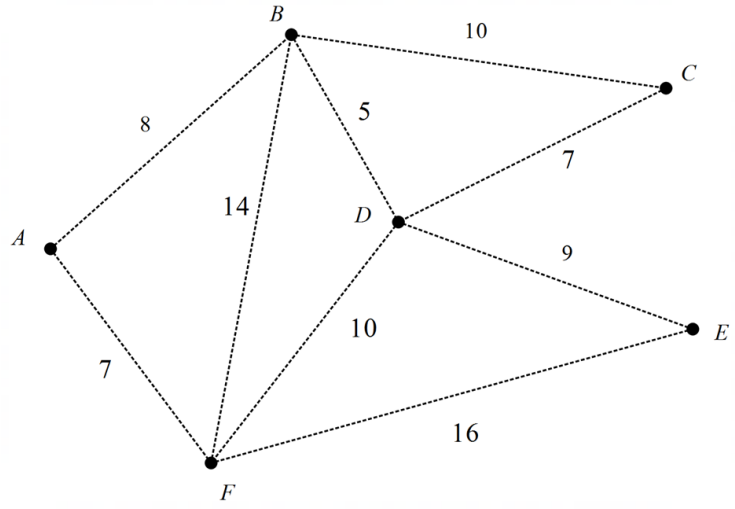

Question 27 (4 marks)

The mean of a set of 16 scores is 8, and the standard deviation of the set is 2.4.
An additional score of 4 is added to the set.

(a) Determine the mean of the set of 17 scores. **2**
Give your answer correct to 1 decimal place.

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(b) What effect has the additional score had on the standard deviation? **2**
Give reason(s) for your answer

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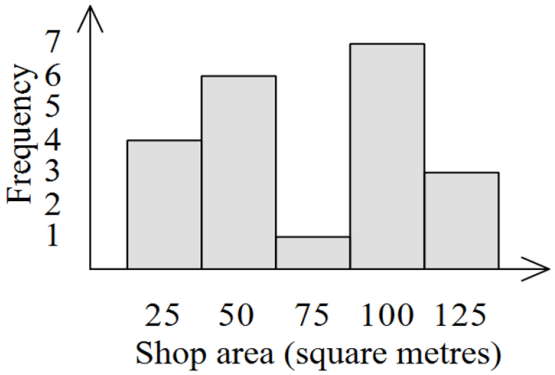
Question 28 (7 marks)

The sizes, in square metres, of the 21 shops in a small shopping centre are summarised in the following histogram.



(a) Using the histogram, determine the average shop area of the shopping centre, correct to 1 decimal place. **2**

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The five-number summary of shop areas is given in the following table.

Min	Q_L	Median	Q_U	Max
32	42	70	101	115

(b) Determine whether there are any outliers in the data set. Support your answer with relevant calculations. **2**

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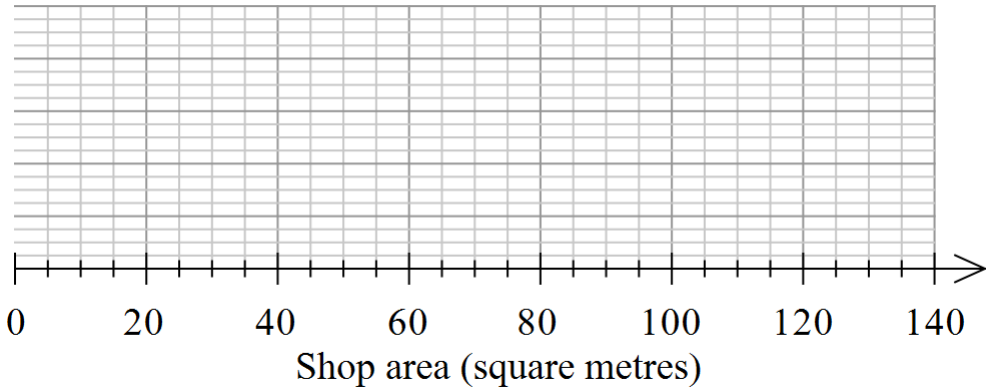
Question 28 continues on page 20

Question 28 (continued)

(c) Sketch a box-and-whisker plot of the data set. **2**



(d) Describe the shape of the distribution of shop areas. **1**

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End of question 28

Question 29 (2 marks)

The time taken to complete a project varies inversely with the number of employees.

The project can be completed by 3 employees in 8 days.

How long will 5 employees take to complete the project?

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Question 30 (3 marks)

The masses of a group of men are normally distributed with mean 78 kg and standard deviation 5 kg. Find the probability, as a percentage, that a man, chosen at random from the group, will have a mass which is:

(a) less than 68 kg? **1**

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(b) between 73 kg and 88 kg? **2**

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End of booklet 1

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

Section II extra writing space

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

2022 Manly Campus - Student Number

Northern Beaches Secondary College

Mathematics Standard 2

Section II Answer Booklet 2

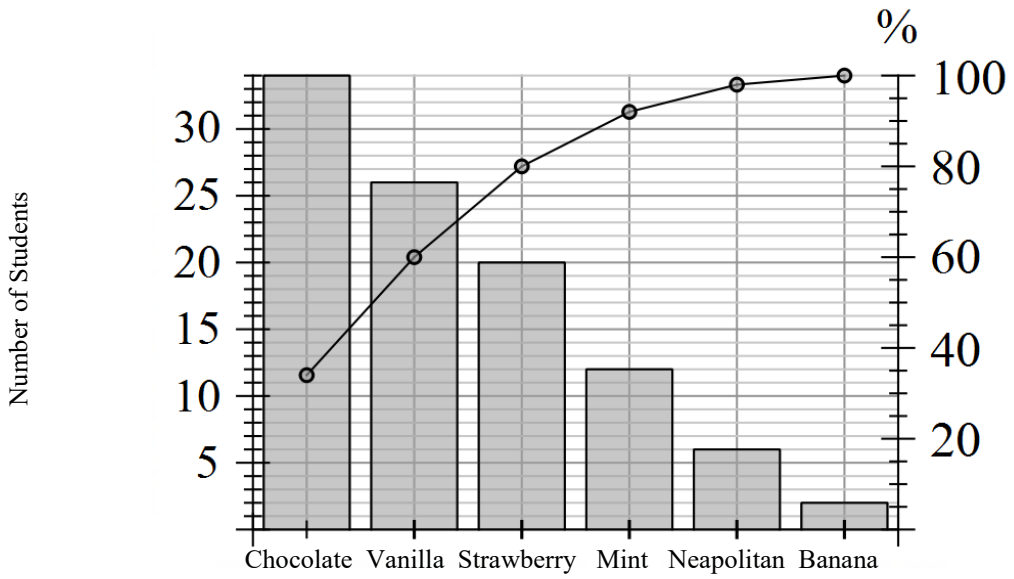
Booklet 2 – Attempt Questions 31 – 41 (43 marks)

Instructions

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

Question 31 (3 marks)

A school principal took a poll to help decide which ice cream flavours to serve at the swimming carnival. The results of the poll are displayed in the following Pareto chart.



(a) How many students were included in this poll?

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(b) What was the most popular flavour amongst students who were polled?

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(c) What percentage of students answered Chocolate, Vanilla, or Strawberry?

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Question 32 (2 marks)

Joao is saving for a holiday, and deposits $2,500 into an annuity account at the end of each 6 months for 3 years. The account pays 6% per annum interest, compounding bi-annually.

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

	A	B	C	D	E	F	G
1		**Future values of an annuity of $1**					
2	**Number of Periods**	**Interest rate**					
3		**1%**	**2%**	**3%**	**4%**	**5%**	**6%**
4	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600
6	3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836
7	4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746
8	5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371
9	6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753
10	7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938

a) Using the table, find the amount of savings Joao has available from their annuity account at the end of three years. **2**

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b) What would be the Present Value (PV) of this annuity? **1**

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Question 33 (6 marks)

A survey of insect life near a stream was conducted.
A scientist collected data about the number of different insect species (y) that were found at different distances (x) from the stream.

Point Label	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Distance (x)	2	4	7	10	11	17	22	24	28	33
Insect species (y)	32	26	20	19	17	13	11	8	7	3

(a) Using your calculator, determine r, the correlation coefficient, to 4 decimal places. **1**

$r =$

(b) Describe the relationship that exists between the two variables. **2**

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(c) Determine the equation of the "least squares" regression line of best fit for the data. **2**

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(d) Estimate the number of insect species that can be found 13 metres from the stream. **1**

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Question 34 (3 marks)

A person takes out a loan of $880 000 at 4.5% p.a. interest for 20 years.

The table below shows monthly repayments for each $1000 borrowed.

	B	C	D	E	F	G
2		Monthly Repayments per $1000 borrowed				
3	Interest Rate	Period of loan (years)				
4	(% pa)	5	10	15	20	25
5	1.5	$ 17.31	$ 8.98	$ 6.21	$ 4.83	$ 4.00
6	2	$ 17.53	$ 9.20	$ 6.44	$ 5.06	$ 4.24
7	2.5	$ 17.75	$ 9.43	$ 6.67	$ 5.30	$ 4.49
8	3	$ 17.97	$ 9.66	$ 6.91	$ 5.55	$ 4.74
9	3.5	$ 18.19	$ 9.89	$ 7.15	$ 5.80	$ 5.01
10	4.0	$ 18.42	$ 10.12	$ 7.40	$ 6.06	$ 5.28
11	4.5	$ 18.64	$ 10.36	$ 7.65	$ 6.33	$ 5.56
12	5	$ 18.87	$ 10.61	$ 7.91	$ 6.60	$ 5.85
13						
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... Sheet2 Sheet1

Over the term of the loan, how much interest will they pay?

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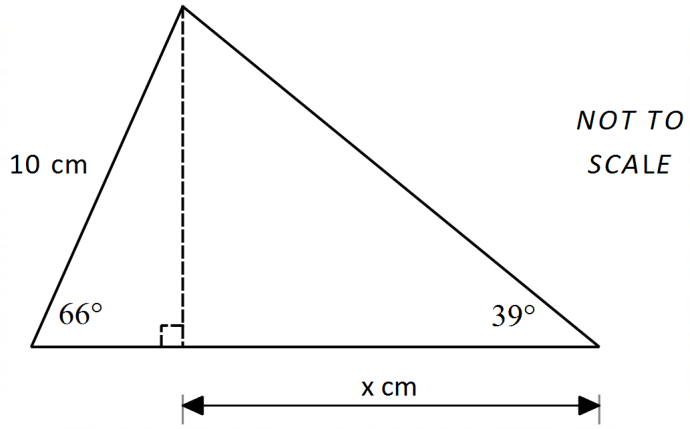
Question 35 (3 marks)

Consider the triangle below.



Calculate the value of x, correct to 2 decimal places. **3**

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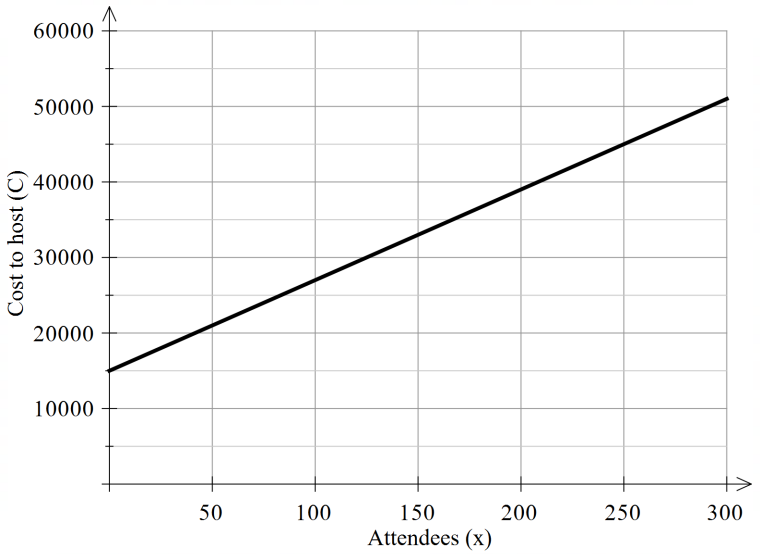
Question 36 (2 marks)

A function centre hosts events for up to 300 people. The cost (C), in dollars, to host an event for x attendees is given by the linear model:

$$C = 15000 + 120x .$$



The revenue model for the line is of the form $R = mx$, where m is the amount each attendee is charged to attend.

Given that the function centre will break even if there are 150 attendees, how much is each person charged to attend the event?

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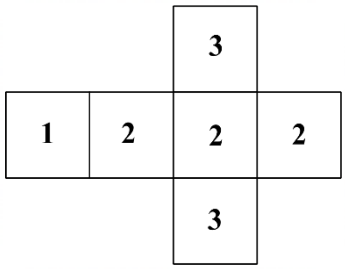
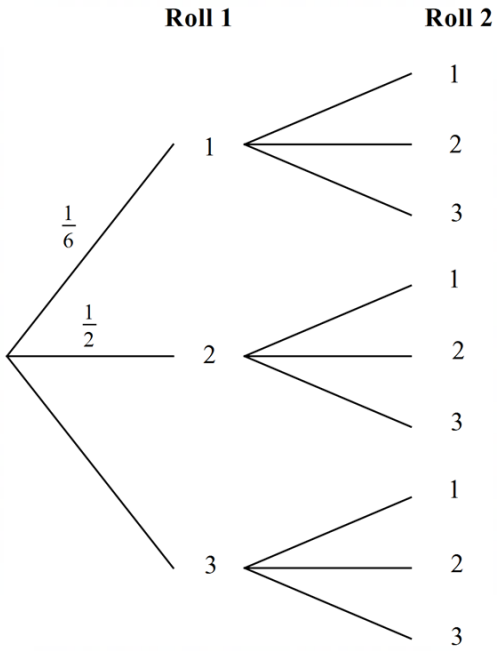
Question 37 (5 marks)

A die is made in the form of a cube. The net of the die is shown below, where the faces are numbered 1, 2, 2, 2, 3, 3.



The die is rolled twice, and the number on the face shown uppermost is recorded each time.

(a) Complete the probability tree by assigning probabilities to each branch. **2**



(b) Determine the exact probability that the total of the two rolls is 5 or a double. **3**

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Question 38 (3 marks)

The table below shows the tax rates for various levels of income.

Taxable Income ($)	**Tax payable**
$0 to $18,200	Nil
$18,201 to $37,000	19c for each $1 over $18,200
$37,001 to $90,000	$3,572 plus 32.5c for each $1 over $37,000
$90,001 to $180,000	$20,797 plus 37c for each $1 over $90,000
$180,001 and over	$54,097 plus 45c for each $1 over $180,000

Gary paid $19 822 in tax for the past financial year.

The Medicare levy is calculated as 2% of a person's taxable income.

How much was Gary required to pay for the Medicare levy?

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Question 39 (5 marks)

The table represents the distance, in kilometres, between six towns, A, B, C, D, E and F.

	A	**B**	**C**	**D**	**E**	**F**
A	-	5	-	22	-	41
B	5	-	17	-	13	-
C	-	17	-	18	24	11
D	22	-	18	-	-	-
E	-	13	24	-	-	9
F	41	-	11	-	9	-

(a) Draw a weighted network diagram to illustrate the network of roads between the towns. **4**

(b) Determine the shortest distance between town A and town E. **1**

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Question 40 (5 marks)

A model of the Earth is made using a scale of 1:65 000 000.

The model has a diameter of 20 cm.

Using the measurement given and the scale of the model, calculate the volume of the earth in cubic kilometres. Express your answer in scientific notation correct to two significant figures.

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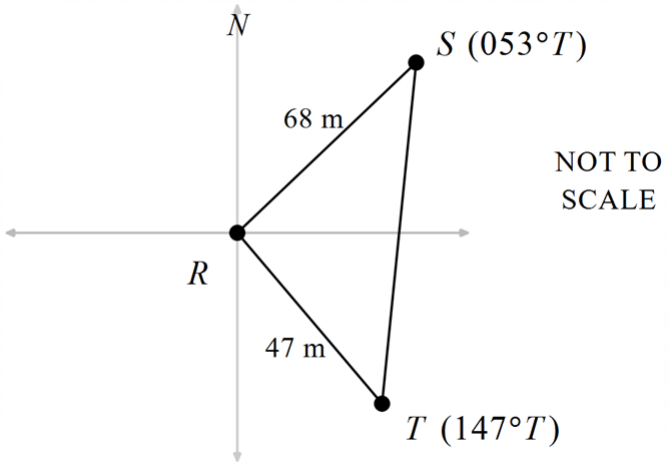
Question 41 (6 marks)

Rita (R), Sara (S) and Terri (T) are standing on a level playing field.

From Rita:

- Sara is 68 metres away on a bearing of $053^\circ T$, and
- Terri is 47 metres away on a bearing of $147^\circ T$.



(a) Show that angle $SRT = 94^\circ$ **1**

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(b) How far apart are Sara and Terri? Give your answer correct to one decimal place. **2**

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Question 41 continues on page 36

Question 41 (continued)

(c) Show that the angle $RST = 33°20'$ and hence, determine the true bearing of Terri from Sara, correct to the nearest minute. **3**

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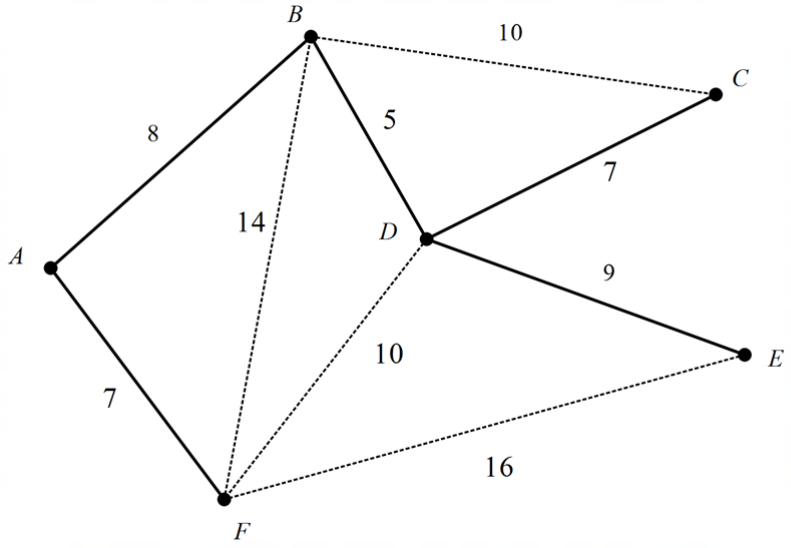
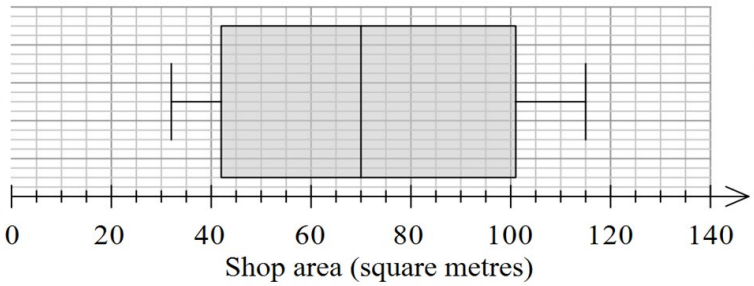
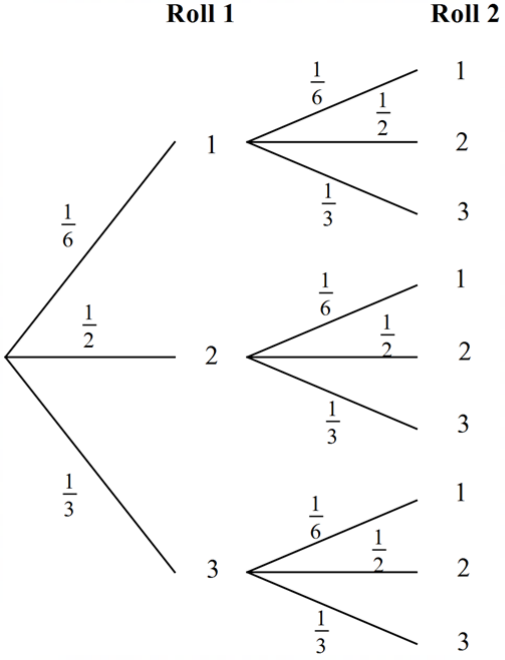
End of Paper

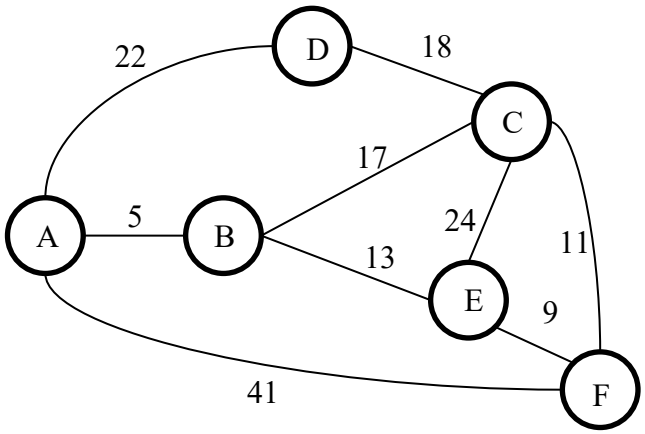
Question	Solution	Allocation
1	2.8×10^{-5}	A
2	$\frac{x+5}{2}=13$	D
3	$\frac{5\times 60\times 24\times 7}{1000}$	D
4	$4x-2y+5=0$ $2y=4x+5$ $y=2x+2.5$ gradient = 2	C
5	8am + 8 hours = 4pm	A
6	Intersections 2, 3 and 4 can all be reached.	C
7	$120 \times 40 \times 20 = 96\ 000\ \text{cm}^3$	D
8	75%	C
9	A 1:2 or C 2:1 due to ambiguity $1D \quad 1:x$ $2D \quad 1:x^2$ $2D \quad 4:1$ $\therefore 1\ D \quad 2:1$	A or C
10	$A=\frac{1}{2}absinC$ $=\frac{1}{2}\times 15\times 8\times \sin 31°$ $=30.92=31m^2$	B
11	$A=\frac{h(a+b)}{2}$ $\frac{h(a+b)}{2}=A$ $h(a+b)=2A$ $a+b=\frac{2A}{h}$ $b=\frac{2A}{h}-a$	C
12	$\text{Dividend yield \%} = \frac{\text{dividend}}{\text{share price}}\times 100\%$ $2.5\% = \frac{0.22}{P}\times 100$ $0.025P = 0.22$ $P = \frac{.22}{0.025}$ $P = 8.80$	D
13	Range=8B-4A=42 A=5 so B=7 as 87-45=42 B=7	B
14	Network B shows each node with 3 paths One to the president Two paths to two other members	B
15	Let x = no. of books and y = no. of comics Jackson bought 6 more books than comics	B

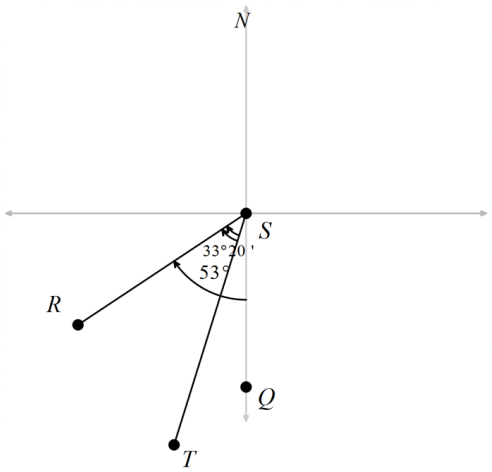
	So $x - y = 6$ Each book price was average \$18 So x books costs $18x$ Each comic price was average \$7 So y comics costs $7y$ *So* $18x+7y=233$ *and* $x - y = 6$	
16	**Interest paid is \$8500 − \$8000 = \$500** $I = \Pr n \Rightarrow 500 = 8000r \times \frac{18}{12}$ $r = \frac{500}{12000} = 4.17\%$	2 marks correct answer 1 mark some progress
17	Annual cost is $175 \times \$0.42 + \frac{9900}{1000} \times \$2.35 = \$96.77$	3 marks correct solution 2marks correct individual costs 1 mark a correct cost
18	**Amount due: $480(1+0.00052)^{21} = \$485.27$** **Interest is: \$485.27 − \$480 = \$5.27**	2 marks correct solution 1 mark makes some progress
19	Annual depreciation is $\$48\,000 - \$45\,660 = \$2\,340$ After 6 years, depreciated value is $\$48\,000 - 6 \times \$2\,340 = \$33\,960$	2 marks correct solution 1 mark makes some progress
20	Area $\approx \frac{15}{2}(13+13.9) + \frac{15}{2}(13.9+12) = 396\,\text{m}^2$	2 marks correct solution 1 mark makes some progress
21 a	$6 = \frac{8 \times A}{8+12}$ $6 \times 20 = 8A$ $A = 15$ mL	2 marks correct solution 1 mark makes some progress
21 b	No, the formula is not linear. Or, by calculation, the dose for a 4-year old child is 3.75 mL	1 mark
22	Change is $3 \times -3 = -9$ Change is a decrease by 9	2 marks correct solution 1 mark makes some progress
23	Sarah gets a raise of $0.03 \times 1300 = \$39$. Sam gets a raise of \$35, since $3\%\text{ of }\$980 = \$29.40 < \$35$ Total raise is \$39+\$35=\$74	2 marks correct solution 1 mark makes some progress
24	$3x - (x-2) = 12$ $3x - x + 2 = 12$ $2x = 10$ $x = 5$	3 marks correct solution 2 marks error in one step 1 mark a correct step
25	Week 1 equates as $14 \times 1.5 = 21$ "normal" hours. If X double-time hours are worked in week 2, then $2X = 21$, so $X = 10.5$ So 10.5 "double time" hours are worked in week 2.	2 marks correct solution 1 mark makes some progress

26	 min value = 7+8+5+7+9 =31	2 marks correct solution 1 mark correct spanning tree
27 a	$\frac{16\times 8+4}{17}=\frac{132}{17}=7.764...\approx 7.8$ (to 1 decimal place)	2 marks correct solution 1 mark makes some progress
b	Since the new score is significantly more than 2.4 away from the old (or new) mean score, the standard deviation will increase.	2 marks correct solution 1 mark correctly states increase
28 a	$\frac{\bar{x}}{n}=4\times 25+6\times 50+75+700+3\times 125$ $=\frac{1550}{21}$ $=73.8$	2 marks correct solution 1 mark makes progress
b	$IQR=101=42=59$ $Q_L-1.5\times IQR=42-1.5\times 59=-46.5$ $Q_U+1.5\times IQR=101+1.5\times 59=189.5$ As there are no scores below -46.5 or above 189.5, there are no outl	2 marks correct solution 1 mark makes progress
c		2 marks correct solution 1 mark makes some progress
d	Symmetrical	1 mark
29	$8=\frac{k}{3}\Rightarrow k=24$ With 5 employees, $T=\frac{24}{5}=4.8$ days	2 marks correct solution 1 mark makes progress
30 a	$P(X<68)=P\left(z<\frac{68-78}{5}\right)$ $=P(z<-2)$ $=0.025$	1 mark

30 b	$P(73 < X < 88) = P\left(\frac{73-78}{5} < z < \frac{88-78}{5}\right)$ $= P(-1 < z < 2)$ $= \frac{1}{2} \times 0.68 + \frac{1}{2} \times 0.95$ $= 0.815$	2 marks correct solution 1 mark makes some progress
31a	$34 + 26 + 20 + 12 + 6 + 2 = 100$ students	1 mark
b	Chocolate is the first and tallest bar, thus more people chose chocolate than any other flavour.	1 mark
c	80% (this can be read from the right side of the chart or by considering the sum of the first 3 bars as a percentage of the total)	1 mark
32 a	Rate = 3% per half year number of periods = 6 Intersection is 6.4684 \$2500 x 6.4684 = \$16171	2 marks correct answer 1 mark - use of other intersection factor
b	$FV = PV(1+r)^n$ $PV = \frac{FV}{(1+r)^n}$ $PV = \frac{16171}{(1+0.03)^6}$ $= \$13\ 542.9579$ $\cong \$13\ 542.96$	1 mark (nb – mark awarded if calculation correct for incorrect value from part a.
33 a	$r = -0.964777...$ ≈ -0.96	1 mark
b	strong, negative linear relationship.	2 marks – must have both strong and negative 1 mark one descriptor
c	$y = 28.51 - 0.82x$	2 marks 1 mark 'm' and 'b' interchanged
d	$28.51 - 0.82 \times 13 = 17.85$ So approximately 18 insect species.	1 mark – using equation derived in part c.
34	Monthly repayment is $880 \times \$6.33 = \$5570.40$ Total loan repayments are $240 \times \$5570.40 = \$1336896$ Interest paid is $\$1336896 - \$880000 = \$456896$	3 marks correct solution 2 marks correct total paid 1 mark correct monthly payment

35	Let h be the perpendicular height, then: $\sin 66^\circ = \frac{h}{10}$ $h = 10\sin 66^\circ$ and $\tan 39^\circ = \frac{h}{x}$ $x = \frac{h}{\tan 39^\circ}$ $= \frac{10\sin 66^\circ}{\tan 39^\circ}$ $= 11.28cm$	3 marks correct solution 2 marks – correct expression for x 1 mark - correct height or correct expression for height
36	**For 150 attendees** $C = 15000 + 120 \times 150 = \$33000$ **and** $R = 150m$. **For break-even:** $150m = 33000$ $m = \frac{33000}{150} = \$220$ **per person**	2 marks - correct solution 1 mark - correct cost for 150 attendees
37a	**Roll 1** **Roll 2**  	2 marks correct solution 1 mark – correct for initial roll of dice.
b	$P(\text{total of 5or a double}) = P(\text{a 2 then 3}) + P(\text{a 3 then 2}) + P(\text{a doubl}$ $= \frac{1}{2}\times\frac{1}{3} + \frac{1}{3}\times\frac{1}{2} + \frac{1}{6}^2 + \frac{1}{2}^2 + \frac{1}{3}^2$ $= \frac{65}{90} = \frac{13}{18}$ P(total of 5 or a double) = P(3 then 2) + P (2 then 3) + P (double)	3 marks correct solution 2 marks – correct with one arithmetic error – attempts to find all relevant probabilities 1 mark – correct for either P(double) or P(5)

	$P_{(5\ or\ double)} = \left(\frac{1}{3}\times\frac{1}{2}\right)+\left(\frac{1}{2}\times\frac{1}{3}\right)+\left(\frac{1}{2}\right)^2+\left(\frac{1}{3}\right)^2+\left(\frac{1}{6}\right)^2$ $= \frac{65}{90} = \frac{13}{18}$	
38	$3572+0.325\times(I-37\,000)=19822$ $0.325\times(I-37\,000)=16250$ $I-37\,000=\frac{16250}{0.325}$ $I-37\,000=50000$ $I=\$87\,000$ So Medicare levy is $\$87\,000\times0.02=\$1740$	3 marks correct solution 2 marks – correct income 1 mark - selects correct tax bracket and attempts calculation.
39 a	Students Note: Easier to review your answer if lines do NOT cross,  	4 marks - all correct answer 3 marks – one error only in diagram 2 mark – more than 4 but less than 8 measurements shown correctly 1 mark provides some relevant information
b	$Distance\ A\ to\ E = 5+13 = 18\ km$	1 mark
40	$D_{earth} = 20\times65\,000\,000 = 1\,300\,000\,000\ cm$ $D_{earth} = 1\,300\,000\,000 \div 100\,000 = 13\,000\ km$ $r_{earth} = 13\,000 \div 2 = 6\,500\ km$ $V = \frac{4}{3}\pi r^3$ $V_{earth} = \frac{4}{3}\times\pi\times6\,500^3$ $V_{earth} = 1.2\times10^{12}\ km^3$	5 marks correct solution 4 marks volume rounded incorrectly 3 marks correct substitution into formula with appropriate scale conversion. 2 marks - correct volume of model. 1 mark - correct Earth radius - correct scale conversion

41a	$\angle SRT = 147^\circ - 53^\circ = 94^\circ$	1 mark correct answer
b	$ST^2 = 68^2 + 47^2 - 2 \times 68 \times 47 \times \cos 94^\circ = 7278.88338..$ $ST = 85.3163... \approx 85.3\text{m}$	2 marks correct answer 1 mark correct substitution
c	By Sine Rule $\dfrac{\sin(\angle RST)}{47} = \dfrac{\sin 94^\circ}{85.316...}$ $\sin(\angle RST) = \dfrac{47 \sin 94^\circ}{85.316...}$ $= 0.549548...$ $\angle RST = 33^\circ 20'$ (to nearest minute)  $\angle QST = \angle QSR - \angle RST = 19^\circ 40'$ $\therefore$ bearing is $199^\circ 40' T$	3 marks correct solution 2 marks – correct angle for $\angle QST$ 1 mark – correct angle for $\angle RST$