CSSA
CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW

Centre Number

Student Number

2015
TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics General 2

Morning Session
Thursday, 30 July 2015

General Instructions

- Reading time – 5 minutes
- Working time – 2 ½ hours
- Write using black or blue pen
  Black pen is preferred
- Calculators may be used
- A formulae and data sheet is provided on a SEPARATE sheet
- In Questions 26 - 30, show relevant mathematical reasoning and/or calculations
- Write your Centre Number and Student Number on the top of this page and on each question where indicated.

Total marks – 100

Section I Pages 3 - 14

25 marks
- Attempt Questions 1 - 25
- Allow about 35 minutes for this section

Section II Pages 15 - 34

75 marks
- Attempt Questions 26 - 30
- Allow about 1 hour and 55 minutes for this section

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Section I

25 marks
Attempt Questions 1–25
Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1–25.

1 What name is given to a mobile phone plan where the credit for service is purchased in advance?

(A) Cap plan

(B) Prepaid plan

(C) Post-paid plan

(D) Unlimited plan

2 Hugo drives his car from Wollongong to Sydney, a distance of approximately 80 kilometres. The journey takes 1 hour 20 minutes.

Which of the following is closest to Hugo's average speed?

(A) 60 km/h

(B) 66·7 km/h

(C) 96 km/h

(D) 106·7 km/h

3 Catherine is a childcare worker who earns $640·00 per week. She receives a pay increase of 4% but then decides to reduce the number of hours she works each week. The reduced hours resulted in a decrease of 9% in her weekly pay.

How much is she paid per week after the reduction of hours?

(A) $559·10

(B) $605·70

(C) $608·00

(D) $725·00

4 The height of the Skywalk at Sydney Tower Eye was measured at 268 metres.

What is the percentage error in this measurement?

(A) 0·018%

(B) 0·037%

(C) 0·187%

(D) 0·373%

5 Jani collects data for a health and sport project.

Which of the following is an example of bivariate data?

(A) Her pulse rate over varying distances run

(B) The distance that she runs each day on her early morning jog

(C) The amount of water she drinks during each run

(D) Her team's goals over the whole AFL season

6 The length of a species of fish in a breeding pond is normally distributed with a mean of 65 millimetres and a standard deviation of 8 millimetres.

What percentage of fish will measure more than 57 millimetres in length?

(A) 16%

(B) 34%

(C) 50%

(D) 84%

7 Simplify: $\frac{20x^2y}{15xy^3}$

(A) $\frac{4x}{3y}$

(B) $\frac{4}{3}x^3y^4$

(C) $\frac{4xy^2}{3}$

(D) $\frac{4x}{3y^2}$

8 Liquid fertilizer concentrate is diluted with water at a rate of 20 millilitres per 10 litres of water. The manufacturer states that 5 litres of diluted mixture are required to fertilize 10 square metres of lawn.

How many millilitres of liquid fertilizer concentrate are required to fertilize 120 square metres of lawn?

(A) 80

(B) 120

(C) 200

(D) 240

9 The number of children in each family living in a street is shown below :

1 3 5 7 8 8 9 10 12

A new family with 7 children moves into the street.

Which measure will change when the new family is included in the data?

(A) Median

(B) Mean

(C) Range

(D) More than one of the above

10 A phone call is made at 11:00 am local time from Manila (120^0E) to Singapore (104^0E).

What is the local time in Singapore when the call is made?

(A) 12·04 am

(B) 9·56 am

(C) 12·04 pm

(D) 9·56 pm

11 A flat rectangular roof is 12·5 metres long and 6 metres wide.

During a storm, 25 millimetres of rain fell on the roof and was captured in a rainwater tank.

How many litres of water were collected in the tank?

(A) 1·875 L

(B) 18·75 L

(C) 187·5 L

(D) 1 875 L

12 A wildlife officer wishes to determine the number of rabbits on an island. She catches and tags 40 rabbits. One week later she catches a second sample of 60 rabbits and finds that 8 of them are tagged.

Which of the following is the best estimate for the rabbit population of the island?

(A) 120

(B) 300

(C) 533

(D) 1 200

13 The table below shows the future value of \$1 invested over different periods of time and at various interest rates.

Use the table to find the future value of \$3 500 invested for 2 years with interest paid quarterly at a rate of 12% per annum.

	Compounded values of \$1					
	Interest rate per period					
Periods	1%	2%	3%	4%	6%	12%
1	1·010	1·020	1·030	1·040	1·060	1·120
2	1·020	1·040	1·061	1·082	1·124	1·254
3	1·030	1·061	1·093	1·125	1·191	1·405
4	1·041	1·082	1·126	1·170	1·262	1·574
5	1·051	1·104	1·159	1·217	1·338	1·762
6	1·062	1·126	1·194	1·265	1·419	1·974
7	1·072	1·149	1·230	1·316	1·504	2·211
8	1·083	1·172	1·267	1·369	1·594	2·476
9	1·094	1·195	1·305	1·423	1·689	2·773
10	1·105	1·219	1·344	1·480	1·791	3·106

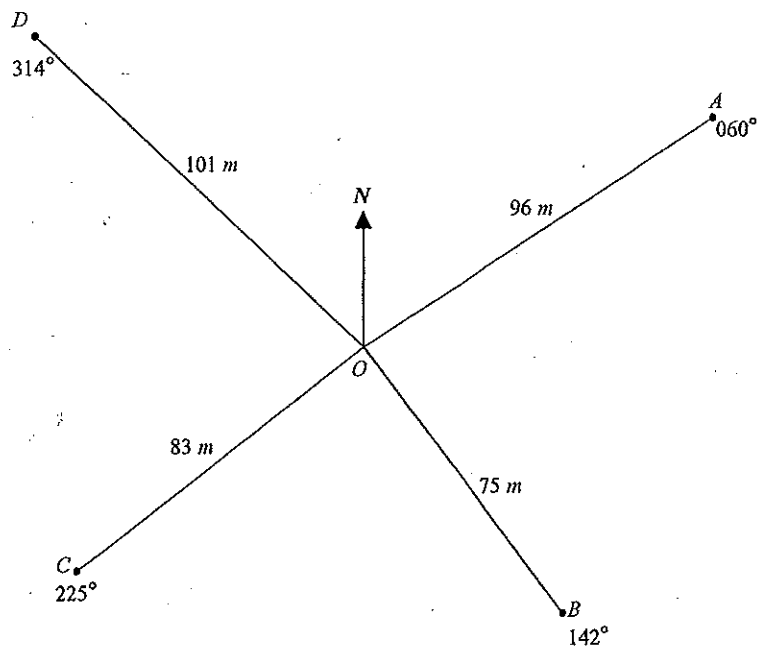
(A) \$3 713·50

(B) \$4 389.00

(C) \$4 434·50

(D) \$7 738·50

14 This diagram shows a radial survey of a park.



Which of the following is closest to the area of the triangular region AOB?

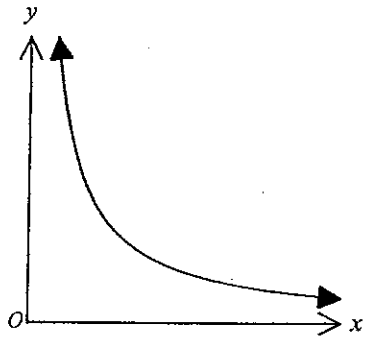
(A) 1 002 m^2

(B) 3 565 m^2

(C) 4 660 m^2

(D) 7 130 m^2

15 The diagram shows a graph of an equation.



Which of the following equations does the graph best represent?

(A) $y = \frac{3}{x}$

(B) $y = (\frac{1}{3})^x$

(C) $y = x^3$

(D) $y = 3^x$

16 A concentration of a certain drug in a hospital drip is 2mg/mL. Yi Ling needs to give a dose of 5g of the drug to her patient over the course of one day.

How many millilitres of the drug will Yi Ling administer to her patient?

(A) 2·5

(B) 25

(C) 250

(D) 2 500

17 Mitchell enters into an agreement with a department store to purchase a home theatre package valued at $12 600 with monthly repayments over 2 years. The store charges reducible interest of 8·2% p.a. and sets the monthly repayments at $620.

What is the equivalent flat rate of interest being charged for this purchase?

(A) 4·9% p.a.

(B) 8·2% p.a.

(C) 9·0% p.a.

(D) 17·9% p.a.

18 Hamid has a set of 5 cards labelled P, Q, R, S and T.
He selects a card at random, replaces it, and then selects a second card.

What is the probability that the two cards that Hamid selects are different?

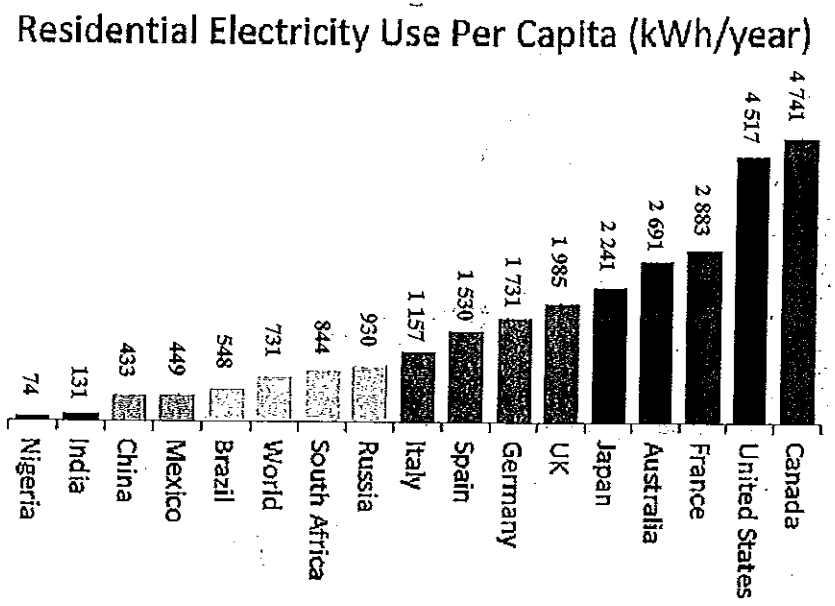
(A) $\frac{1}{5}$

(B) $\frac{2}{5}$

(C) $\frac{3}{5}$

(D) $\frac{4}{5}$

19



The graph above shows the average annual electricity usage per person in different countries.

The cost of electricity is \$0·241/kWh in both Australia and the UK.

What is the difference in the average annual cost of electricity for a person living in Australia and someone living in the UK?

(A) \$170·15

(B) \$478·39

(C) \$648·29

(D) \$706·00

20 For the financial year ending on the 30th June 2014, the Medicare levy was 1·5% of the taxable income. The following year, it was increased to 2%.

Jessica's taxable income for the two years is tabled below.

Financial Year	Taxable Income
ending 30th June 2014	\$76 800
ending 30th June 2015	\$72 450

Which of the following statements is true?

(A) Jessica paid \$449·25 more in 2015.

(B) Her 2015 Medicare levy was \$449·25 less than in 2014.

(C) There was an increase of \$297 from 2014 to 2015.

(D) She paid \$297 less in 2015 compared with 2014.

21 In the final round of a sporting competition, each team has to play against every other team. If there are 4 teams in the final round of the competition, how many games are played?

(A) 4

(B) 6

(C) 8

(D) 24

22 Approximately how many seconds would it take to download 3·6 MB of data if the transfer rate is 80kbps?

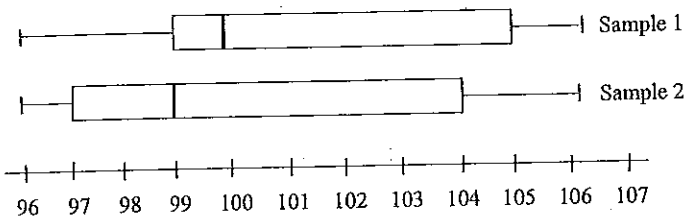
(A) 45

(B) 47

(C) 360

(D) 377

23 Packets of toothpicks should contain 100 toothpicks. Two samples of 50 packets are tested and the results are shown in the diagram below.



Which of these statements is true?

(A) Sample 1 has a greater interquartile range than sample 2.

(B) Sample 1 has a greater range than sample 2.

(C) Packets in the lower 25% of sample 1 contain more toothpicks than packets in the lower 25% of sample 2.

(D) The median of sample 1 is lower than the median of sample 2.

24 Make n the subject of the equation $f = \frac{m^2 - n^2}{4m}$.

(A) $n = \pm\sqrt{\frac{4m - f}{m^2}}$

(B) $n = \pm\sqrt{\frac{f - 4m}{m^2}}$

(C) $n = \pm\sqrt{m^2 - 4mf}$

(D) $n = \pm\sqrt{4mf - m^2}$

25 In a competition, g tickets are sold and there is one prize.
Kiera purchases p tickets in the competition.

What is the probability of Kiera NOT winning a prize in this competition?

(A) $1 - \frac{p}{g}$

(B) $1 - \frac{g}{p}$

(C) $g \times p$

(D) $1 - p \times g$

Section II

Centre Number

Student Number

75 marks
Attempt Questions 26 - 30
Allow about 1 hour and 55 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 on page 35. If you use this space, clearly indicate which question you are answering.

Question 26 (15 marks)

(a) Helen's \$75 per month mobile phone plan was capped so that she could make calls and texts to the value of \$800 per month. She did not realise that after she had reached this amount there were additional charges.

The charges are shown in the table below.

Additional Charges	
Calls	\$0·50
Texts	\$0·20

In June, Helen exceeded her capped plan by making an extra 12 calls and 25 texts.

What is the total charge on her phone bill for the month of June? **2**

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(b) In an office the internet speed (kbps) varies inversely with the number of people using their computers. The speed is 15 kbps when there are 52 office workers on their computers.

Find how many workers are using their computers in the office if the speed of the internet is 10 kbps. **2**

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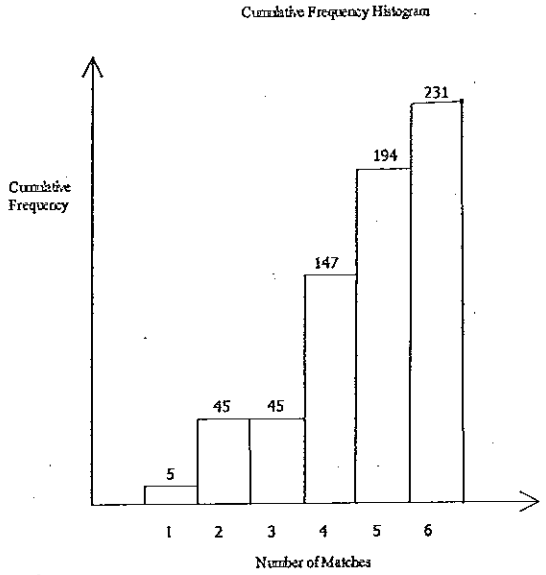
Question 26 (continued)

(c) The following cumulative frequency histogram represents the runs Steve Smith gained in six matches in a One Day International Series



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(i) Give a reason why the cumulative frequency for match 3 is the same as the cumulative frequency for match 2. **1**

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(ii) How many runs did Steve score in the fourth match? **1**

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(iii) What was Steve Smith's average run score over the International Series. **1**

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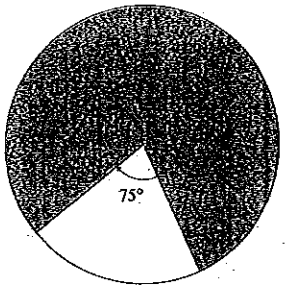
Question 26 (continued)

(d) Calculate the area of the shaded sector of the circle with radius 2·4 centimetres. (Give your answer correct to 1 decimal place) 2



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(e) Jackson and Emily want to have $30 000 as a deposit for a new home in 5 years time. What single amount should they invest now in order to achieve this goal if the bank is offering 6·5%p.a. with interest compounded annually? 2

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Question 26 (continued)

(f) Sarah collected information from two suburbs, Greentown and Redtown, to investigate the number of 5 year old children who have been vaccinated against Measles.

Her results are partially shown in the table below.

	Greentown	Redtown	TOTAL
Vaccinated	477		919
Not vaccinated		35	72
TOTAL	514	477	991

Which suburb has the higher percentage of children who have NOT been vaccinated? Justify your answer with mathematical working. 2

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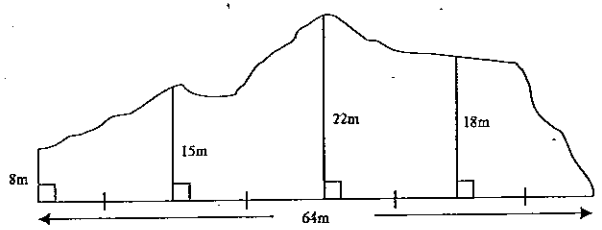
(g) The diagram shows a block of land.



Use two applications of Simpson's Rule to determine the area to the nearest square metre. 2

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Question 27 (15 marks)

(a) The table shows the blood alcohol content (BAC) data collected during a random breath test (RBT) on a weekend.

	Drivers under the age of 25	Drivers 25 years and older
BAC less than 0.05	630	630
BAC 0.05 and greater	37	12

(i) How many of the drivers under the age of 25 had a BAC of 0.05 or more? 1

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(ii) What is the probability that a driver who is 25 years and older will have a BAC less than 0.05? 1

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(b) Frankie has been offered a job by two different sales companies.

Company A	12% commission on total sales.
Company B	\$500 per fortnight retainer plus 8% commission on all sales.

Both companies have told Frankie that his average weekly sales will be \$7 250. 2

Which company will pay Frankie the greater amount? Support your answer with appropriate mathematical calculations.

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(c) Calculate the shortest distance between the cities of Adelaide (35^0S, 139^0E) and Tokyo (36^0N, 139^0E). 2

You may assume the radius of the earth is 6400 kilometres.

Answer correct to nearest kilometre.

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(d) It costs \$10 to play a game in which the probability of winning \$50 is $\frac{2}{10}$ and the probability of winning \$20 is $\frac{3}{10}$.

If no prize is won then the player loses \$15.

(i) What is the probability of not winning a prize in this game? 1

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(ii) Calculate the financial expectation for this game. 1

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(e) Yummybake Food Co. produce 600 gram loaves of sliced bread each containing 20 slices of bread. The weight of each slice is normally distributed with a mean of 30 grams and a standard deviation of 2·4 grams.

(i) A randomly chosen slice of the bread is found to weigh 31·5 grams.

What is the z-score for the weight of this slice of bread? 1

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From each day's production, 3 slices are selected and weighed as part of the company's quality control process. If the weight of two or more of these slices varies by more than 1·5 standard deviations from the mean, then production will be stopped while the machinery is inspected.

(ii) On a particular day, the 3 slices weigh 33·6 grams, 27·4 grams and 33·2 grams. Will the machinery need to be inspected on that day? Justify your response with appropriate calculations. 2

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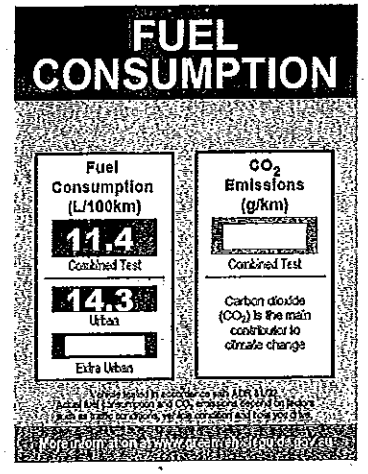
(f) The fuel consumption for Sandra's car is 14·3 L/100km for Urban conditions.

Her Combined Test fuel consumption is 11·4 L/100km.

Extra Urban conditions are freeway conditions.



(i) The fuel consumption for the Combined Test is the average of the Urban and Extra Urban rates.

Calculate Sandra's Extra Urban fuel consumption? 1

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(ii) Sandra travels a distance of 512 kilometres to work each month in urban conditions.

How many litres of fuel does she use in a month? 1

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(iii) Sandra travels to work for 11 months each year. In one year, her car emits 816.64 kilograms of carbon dioxide (CO_2).

Calculate her rate of CO_2 emission in grams per kilometre (g/km). 2

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Question 28 (15 marks)

(a) Solve these equations simultaneously to find the values of x and y. 3

$$x - y = 7$$
$$3x + 4y = 14$$

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(b) The stem and leaf diagram below shows the number of hours of driving experience recorded by a group of 40 learner drivers during the first 4 months after obtaining a learner's permit.

Male							Female			
				8	0	7				
				7	1	3	4			
			4	1	2	0	2	5	7	
		4	3	3	0	3	1	1	4	6
	8	6	5	4	2	4	2	2	7	
9	8	7	7	5	3	5	3	3		
		6	4	4	2	6	5			

Compare and contrast the data for male and female learner drivers. In your response, consider the shape of the two distributions and make reference to measures of location and spread. 3

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Question 28 (continued)

(c) A new company, JamesInc, was launched in 2014, providing anti-virus and hacking detection systems. They offered free registrations to the first 400 customers.
In that year, the number, (y), of registered users over n months was represented by the formula:

$$y = A(2^n)$$

(i) Given $y = 400$ when $n = 0$, find the value of A in the equation. 1

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(ii) What does A represent in this situation? 1

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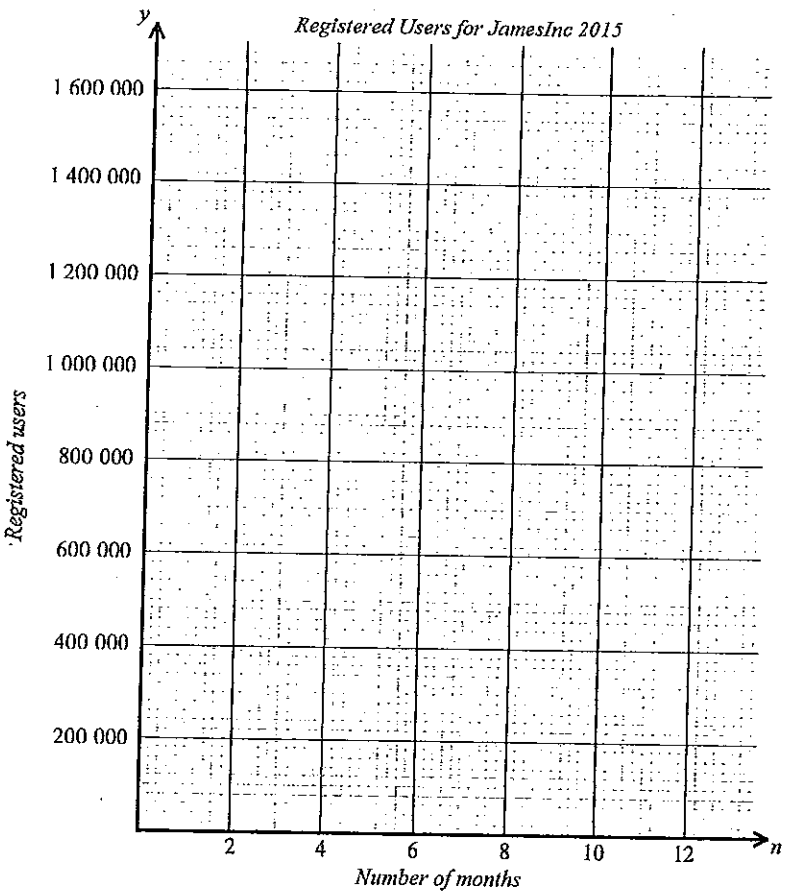
(iii) Complete the following table : 1

months (n)	0	2	4	6	8	10	12
registered users (y)	400	1 600	6 400		102 400		1 638 400

Question 28 (continued)

(iv) Sketch the values from the table on the grid below 2



(v) Use your graph to find the approximate time it took to pass 800 000 registered users. 1

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Question 28 (continued)

(d) Below is a table representing present value interest factors.

Table of present value interest factors						
r	0·0060	0·0065	0·0070	0·0075	0·0080	0·0085
N						
30	27·38007	27·17630	26·97465	26·77508	26·57758	26·38211
31	28·21080	27·99434	27·78018	27·56832	27·35871	27·15133
32	29·03659	28·80709	28·58012	28·35565	28·13364	27·91406
33	29·85744	29·61460	29·37450	29·13712	28·90242	28·67036
34	30·67340	30·41689	30·16336	29·91278	29·66510	29·42029
35	31·48449	31·21400	30·94673	30·68266	30·42172	30·16389
36	32·29075	32·00596	31·72466	31·44681	31·17235	30·90123
37	33·09220	32·79280	32·49718	32·20527	31·91701	31·63236
38	33·88886	33·57457	33·26433	32·95808	32·65576	32·35732
39	34·68078	34·35129	34·02615	33·70529	33·38865	33·07617

Mel wants to take out a loan for \$7 400. The bank is offering her a 3 year repayment plan with interest being charged at 8·4% p.a.

(i) Use the table to find the monthly repayments for Mel's loan. 1

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(ii) After re-evaluating her monthly spending habits, Mel determines that she will be able to afford an additional \$35 each month for her loan repayments. She is hoping that this will mean she can repay the loan in two and a half years instead of three.

Will Mel be able to pay the loan in full in two and a half years? 2

Support your answer with appropriate calculations based on the information in the table.

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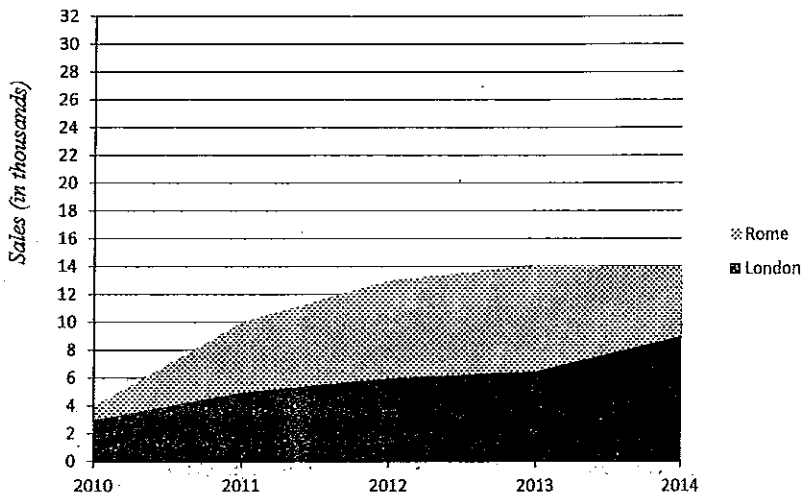
Question 29 (15 marks)

(a) The area chart below shows the sales of NO BURN sunscreen in Rome and London for each year from 2010 to 2014.

NO BURN sunscreen sales



The sales of NO BURN for Sydney are shown in the table below.

Year	2010	2011	2012	2013	2014
Sales in SYDNEY	8 000	10 000	12 000	15 000	14 000

(i) On the area chart above, add the sales information for Sydney. 1

(ii) Find the difference in sales between Sydney and Rome in 2013. 1

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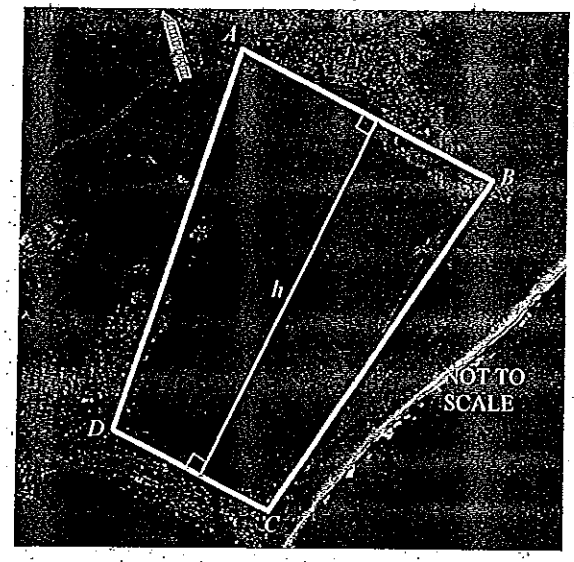
Question 29 (continued)

(b) Water for Ourtown is supplied by a lake that is shown in the aerial photograph below.



When full, the surface area of the lake can be approximated by overlaying a trapezium on the photograph as shown.

The following measurements were recorded :

$AB = 395$ metres
$CD = 287$ metres
$h = 620$ metres

(i) Use the measurements to calculate the approximate surface area of the lake. Give your answer to the nearest hectare. 2

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(ii) The capacity of the lake is 510 000 kilolitres. The average daily consumption of water in Ourtown is 625 000 litres.

How many days' supply does the lake hold? 1

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Question 29 (continued)

(b) (iii) Ourtown Water Company sets fixed charges and service fees totalling \$196·52 per quarter for their customers. In addition to this, water usage is priced as follows:

\$2·232 per kilolitre of fresh water used.
\$1·781 per kilolitre of recycled water used.

The Cooper family uses 25 200 litres of water each month. Of this usage, 76% is fresh water and recycled water makes up the remainder.

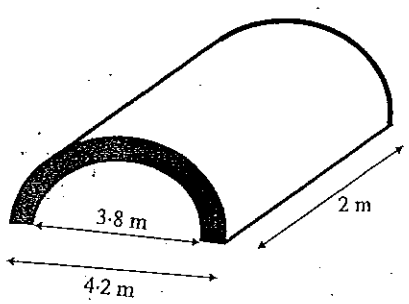
Use this information to calculate the total cost of the Cooper family's quarterly water bill. 3

(c) A three-digit number is selected from the numbers 3, 4, 5, 7, 8, 9 with no repetition. 2

What is the probability that the number formed is greater than 800?

Question 29 (continued)

(d) The diagram below shows a concrete cover used to protect a drain. The cover has a semi-circular cross section with an outer diameter of 4·2 metres. The inner diameter is 3·8 metres and the cover is 2 metres long.



NOT TO SCALE

Calculate the volume of concrete required to manufacture the cover. 2

(e) Solve the equation $\frac{15-y}{3}=10-\frac{50+2y}{4}$. 3

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Question 30 (15 marks)

(a) Valentin has a reaction time of 1·8 seconds. He is driving at 70 km/h when he sees a hazard in the road. He applies the brakes and comes to a stop after 23·8 metres.

(i) What is Valentin's reaction distance in metres? 1

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(ii) Use the fact that *stopping distance = {reaction time distance}+ {braking distance}* to calculate Valentin's stopping distance? 1

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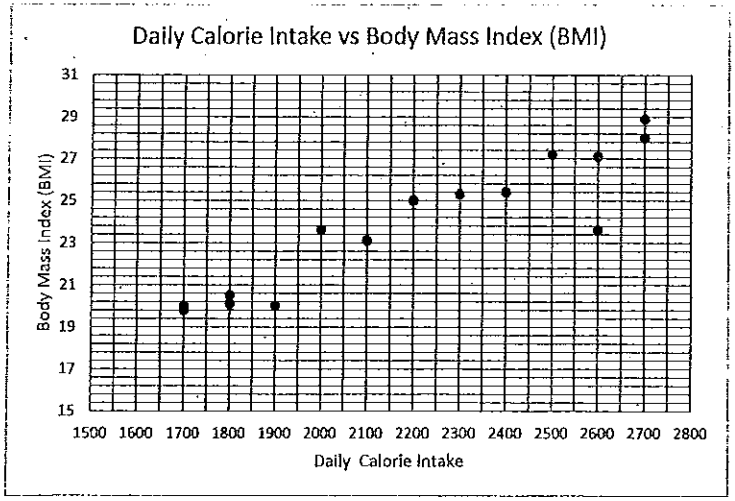
Question 30 (continued)

(b)



The scatterplot shows the relationship between the Daily Calorie Intake and Body Mass Index (BMI) for a group of 15 adults.

(i) The correlation coefficient for the data is $r = 0{\cdot}93$.

Explain what the correlation coefficient indicates about the relationship between daily calorie intake and BMI for these adults. 1

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(ii) The table below shows the mean and standard deviation for calorie intake and body mass index.

	Mean	Standard Deviation
Daily Calorie Intake (x)	2 200	357·77
Body Mass Index (BMI) (y)	23·84	3·08

By making use of the formula on the Formula and Data Sheet, the information in the table and the value of r given, find the equation of the least-squares line of best fit. 3

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(iii) Explain why the equation of the least-squares line would NOT be reliable for predicating the BMI of a person who consumes 5000 calories daily? 1

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(c) Kieran has a credit card issued by Genmat Banking Coorporation. The terms and conditions are outlined below.

GENMAT Banking Coorporation
TERMS of USE for CREDIT CARDS

No interest free period.

Daily interest is charged from the date of purchase to the date of payment inclusive of both these days.

Current interest rates :
- 13·49% p.a. on all purchases
- 21·49% p.a. on cash advances.

Minimum monthly payment :
5% of the balance owing or $35 (whichever is greater).

The balance on Kieran's credit card on July 14th was $0.

On July 15th, Kieran made several purchases, charging a total of $450 to his card. On the same day, he also withdrew $200 in cash from an ATM using the card. These were the only transactions on his credit card for the month.

If Kieran is required to make a monthly payment on his credit card on August 10th, how much will he need to pay to cover the minimum monthly payment? 3

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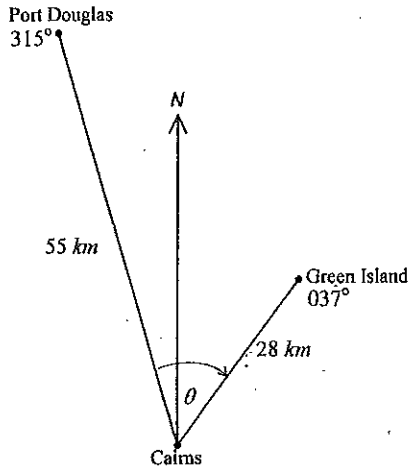
(d) Port Douglas is 55 kilometres from Cairns on a bearing of 315°. Green Island is 28 kilometres from Cairns on a bearing of 037°.



(i) Calculate size of θ. 1

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(ii) Find the distance from Port Douglas to Green Island, correct to the nearest kilometre. 2

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(iii) What is the bearing of Green Island from Port Douglas? 2

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End of paper

Section II Extra Writing Space

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

CSSA

CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW
2015 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS GENERAL 2

Section I
25 marks

Questions 1-25 (1 mark each)

Question	Answer	Content	Syllabus Assessed	Targeted Performance Bands
1	B	FSCo1: Interpret mobile phone plans	MGP-6	2-3
2	A	FSDr3: Average speed	MGP-5	2-3
3	B	MM1: Repeated percentage change	MGP-5	2-3
4	C	MM4: Percentage error	MG2H-5	2-3
5	A	FSHe1: Biometric data	MG2H-2	2-3
6	D	DS5: Normally distributed data	MG2H-7	3-4
7	D	AM1: Algebraic manipulation	MGP-2	3-4
8	B	MM1: Calculation of rates	MGP-5	3-4
9	A	DS3: Measures of location	MGP-7	3-4
10	B	MM6: Time difference	MG2H-4	3-4
11	D	FSRe2: Catchment areas	MG2H-4	3-4
12	B	DS6: Capture and recapture	MG2H-2	3-4
13	C	FM2: Future value	MGP-6	3-4
14	B	MM5: Radial survey	MG2H-4	3-4
15	A	AM5: Non linear relations	MG2H-3	3-4
16	D	FSHe2: Concentration of medication	MG2H-5	4-5
17	C	FM4: Flat rate interest	MG2H-6	4-5
18	D	PB2: Application of probability	MG2H-8	4-5
19	A	FSRe3: Energy, cost of electricity	MG2H-2	4-5
20	C	FM3: Taxation, Medicare levy	MGP-6	4-5
21	B	PB2: Unordered selections	MG2H-8	4-5
22	D	FSCo2: Digital download of data	MGP-8	4-5
23	C	DS4: Interpreting sets of data	MG2H-2	4-5
24	C	AM3: Further algebraic manipulation	MG2H-9	5-6
25	A	PB1: Theoretical probability	MGP-8	5-6

Section II
Question 26

26(a) (2 marks)
Content: FSCo1
Outcomes assessed: MGP-6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Total charges $= \$75.00 + 12 \times \$0.50 + 25 \times \$0.20$ $= \$86.00$	1 mark correct additional call charges of \$11.00 2 marks correct answer	2

26(b) (2 marks)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$S = \frac{k}{n} \quad \therefore 15 = \frac{k}{52}$ $k = 780$ $10 = \frac{780}{N} \quad \therefore N = 78$	1 mark correct value of k. 2 marks correct solution	2

26(c)(i) (1 mark)
Content: DS2
Outcomes assessed: MGP-1
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
He did not score any runs in the third match (or equivalent statement).	1 mark correct response.	1

26(c)(ii) (1 mark)
Content: DS2
Outcomes assessed: MGP-2
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
102 runs	1 mark correct answer	1

26(c)(iii) (1 mark)
Content: DS3
Outcomes assessed:
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Average $= \frac{231}{6}$ $= 38.5$	1 mark for correct answer.	1

26(d) (2 marks)
Content: MM4
Outcomes assessed: MG2H-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$A = \frac{285}{360} \times \pi \times 2.4^2$ $= 14.3 \text{ cm}^2$	1 mark for correct substitution into the correct formula. 2 marks for correct solution	2

26(e) (2 marks)
Content: FM4
Outcomes assessed: MG2H-6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$PV = \frac{FV}{(1+r)^n}$ $PV = \frac{30000}{(1.065)^5}$ $PV = \$21\,896{\cdot}43$	1 mark correct substitution into the correct formula 2 marks for correct solution.	2

26(f) (2 marks)
Content: DS4
Outcomes assessed: MG2H-2
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Greentown : $\frac{37}{514} \times 100 = 7{\cdot}20\%$ Redtown : $\frac{35}{477} \times 100 = 7{\cdot}34\%$ Redtown has the highest percentage of children not vaccinated.	1 mark an attempt to calculate percentages for both suburbs. 2 marks for a correct statement supported by correct and appropriate working.	2

26(g) (2 marks)
Content: MM4
Outcomes assessed: MG2H-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$A = \frac{h}{3}(d_f + 4d_m + d_L)$ $A_1 = \frac{16}{3}(8 + 4 \times 15 + 22)$ $= \frac{16}{3} \times 90$ $= 480$ $A_2 = \frac{16}{3}(22 + 4 \times 18 + 0)$ $= \frac{16}{3} \times 94$ $= 501\frac{1}{3}$ Total area $= 480 + 501\frac{1}{3}$ $= 981 \text{ m}^2$	1 mark for one correct application of Simpson's rule. 2 marks for correct solution using two applications of Simpson's rule.	2

Question 27
27(a)(i) (1 mark)
Content: FSDr3
Outcomes assessed: MGP-8
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
37 drivers	1 mark for correct answer.	1

27(a)(ii) (1 mark)
Content: FSDr3
Outcomes assessed: MGP-8
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\frac{630}{642} = \frac{105}{107} = 0.981$ (3 dp)	1 mark for correct answer.	1

27(b) (2 marks)
Content: FM1
Outcomes assessed: MGP-6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Company A : 12% of \$7 250 × 2 = \$1 740 Company B : \$500 + 8% of \$7 250 × 2 = \$1 660 Company A will pay the greater amount.	**1 mark** for calculating the fortnightly pay for each company. **2 marks** for correct conclusion from accurate calculations for the two companies.	2

27(c) (2 marks)
Content: MM6
Outcomes assessed: MG2H-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Difference in latitude = 71° Distance = $\frac{71}{360} \times 2 \times \pi \times 6400$ = 7 931 km (nearest km).	**1 mark** correct formula used with incorrect angle. **2 marks** correct solution.	2

27(d)(i) (1 mark)
Content: PB2
Outcomes assessed: MG2H-8
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Probability of not winning = $1-(\frac{2}{10}+\frac{3}{10})$ $= \frac{1}{2}$	**1 mark** for correct answer.	1

27(d)(ii) (1 mark)
Content: PB2
Outcomes assessed: MG2H-8
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Financial Expectation = $\frac{2}{10} \times \$50 + \frac{3}{10} \times \$20 - \frac{1}{2} \times \$15 - \$10$ = –\$1·50	**1 mark** for correct answer	1

27(e)(i) (1 mark)
Content: DS5
Outcomes assessed: MG2H-7
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$z = \frac{x - \tilde{x}}{s}$ $= \frac{31 \cdot 5 - 30}{2 \cdot 4}$ = 0.625	**1 mark** for correct answer.	1

27(e)(ii) (2 marks)
Content: DS5
Outcomes assessed: MG2H-10
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$z_1 = \frac{33 \cdot 6 - 30}{2 \cdot 4}$ $z_1 = \frac{27 \cdot 4 - 30}{2 \cdot 4}$ $z_1 = \frac{33 \cdot 2 - 30}{2 \cdot 4}$ = 1·5 = –1·08 = 1·3 No inspection is needed.	**1 mark** calculation of z scores for all three values. **2 marks** for correct conclusion from calculations.	2

27(f)(i) (1 mark)
Content: FSDr2
Outcomes assessed: MGP-5
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$11 \cdot 4 = \frac{14 \cdot 3 + E}{2}$ $22 \cdot 8 = 14 \cdot 3 + E$ Extra Urban fuel consumption is 8·5L/100km.	**1 mark** correct answer.	1

27(f)(ii) (1 mark)
Content: FSDr2
Outcomes assessed: MGP-5
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$5{\cdot}12 \times 14{\cdot}3 = 73{\cdot}216$ litres.	**1 mark** correct answer.	1

27(f)(iii) (2 marks)
Content: FSDr2
Outcomes assessed: MGP-5
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Distance $= 512 \times 11$ $= 5\,632$ km CO_2 emission $= \dfrac{816{\cdot}64 \times 1000}{5632}$ $= 145$ g/km.	**1 mark** calculating the distance travelled in 11 months. **2 marks** correct rate of CO_2 emission.	2

Question 28
28(a) (3 marks)
Content: AM3
Outcomes assessed: MG2H-3
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$x - y = 7 \Rightarrow y = x - 7$ $3x + 4y = 14 \Rightarrow 3x + 4(x-7) = 14$ $3x + 4x - 28 = 14$ $7x = 42$ $x = 6$ $y = x - 7$ $y = 6 - 7$ $y = -1$ $\therefore x = 6, y = -1$	**1 mark** evidence of using a correct method in solving simultaneous equations e.g. making y the subject then substituting or multiplying the first equation through by a constant in order to use elimination. **2 marks** obtaining one correct value for either x or y but not the other. Alternately, an incorrect value for the first unknown with correct attempt to find the second value. **3 marks** correct values for x and y with supporting calculations. Bald correct answers : **1 mark only**	3

28(b) (3 marks)
Content: DS4
Outcomes assessed: MG2H-10
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
For males, the distribution is negatively skewed while the female distribution is symmetrical. The median for males is higher at 46 than the median for females which is 31. The range for males and females is the same at 58.	Award **1 mark** for each reference (shape, centre, spread).	3

28(c)(i) (1 mark)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$400 = A(2^0)$ $A = 400$	**1 mark** correct value of A.	1

28(c)(ii) (1 mark)
Content: AM5
Outcomes assessed: MG2H-10
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
A represents the number of free registrations issued.	**1 mark** correct answer.	1

28(c)(iii) (1 mark)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 2-3

Solution								Criteria	Marks
n	0	2	4	6	8	10	12	**1 mark** for both correct values.	1
A	400	1 600	6 400	25 600	102 400	409 600	1 638 400		

DISCLAIMER
The information contained in this document is intended for the professional assistance of teaching staff. It does not constitute advice to students. Further it is not the intention of CSSA to provide specific marking outcomes for all possible Trial HSC answers. Rather the purpose is to provide teachers with information so that they can better explore, understand and apply HSC marking requirements, as established by the NSW Board of Studies.
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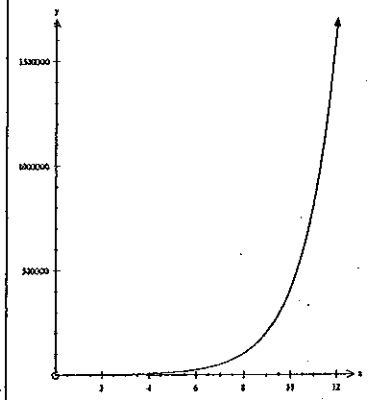
28(c)(iv) (2 marks)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
	**1 mark** correctly plotting points from table in (ii). **2 marks** joining plotted points to make a smooth curve.	2

28(c)(v) (1 mark)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Approximately 11 months.	**1 mark** correct answer. NB Answer should be consistent with the graph drawn in (iv).	1

28(d)(i) (1 mark)
Content: FM5
Outcomes assessed: MG2H-6
Targeted Performance Bands: 3-4

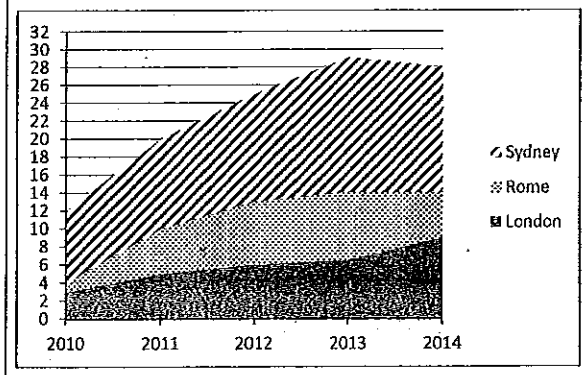
Solution	Criteria	Marks
$7\,400 = 31{\cdot}72466 \times M$ $M = \$233{\cdot}26$	**1 mark** for correct answer.	1

28(d)(ii) (2 marks)
Content: FM5
Outcomes assessed: MG2H-10
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
To repay the loan in two and a half years would require repayments of $M = 7\,400 \div 26{\cdot}97465$ $M = \$274{\cdot}33$ $\$274{\cdot}33 - \$233{\cdot}26 = \$41{\cdot}07$ No, she would not be able to repay the loan in 2 ½ years with an extra $35.	**1 mark** calculating the new repayment amount (or equivalent). **2 marks** for correct conclusion supported be appropriate calculations.	2

Question 29

29(a)(i) (1 mark)
Content: DS4
Outcomes assessed: MG2H-2
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
	**1 mark** for correct plotting of Sydney sales figures on the area chart.	1

29(a)(ii) (1 mark)
Content: DS4
Outcomes assessed: MG2H-2
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Sales for Sydney – sales for Rome = 15 000 – 8 000 = 7 000	**1 mark** for correct answer.	1

29(b)(i) (2 marks)
Content: FSRe2
Outcomes assessed: MG2H-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$A = \frac{h}{2}(a+b)$ $A = \frac{620}{2}(395+287)$ $A = 211420m^2$ = 21.142 hectares	**1 mark correct** use of area of trapezium formula to obtain area in square metres. **2 marks** for correct answer in hectares.	2

29(b)(ii) (1 mark)
Content: FSRe2
Outcomes assessed: MG2H-1
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Number of days = 510 000 ÷ 625 = 816 days	**1 mark** for correct answer.	1

29(b)(iii) (3 marks)
Content: FSRe2
Outcomes assessed: MG2H-1
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Cost of fresh water : 0·76 × 25·2 × 2·232 = $42·75 / month = $128·25 / quarter Cost of recycled water : 0·24 × 25·2 × 1·781 = $10·77 / month = $32·31 / quarter Total cost of the quarterly water bill : $128·25 + $32·31 + $196·52 = $357·08	**1 mark** for cost of fresh water. **1 mark** for cost of recycled water. **1 mark** for addition of fixed costs.	3

29(c) (2 marks)
Content: PB2
Outcomes assessed: MG2H-8
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Total numbers formed : 6 × 5 × 4 =120 Numbers greater than 800 : 2 × 5 × 4 = 40 P(>800) = $\frac{40}{120}$ or $\frac{1}{3}$	**1 mark** progress towards counting both the total number of possibilities and the number greater than 800. **2 marks** correct answer.	2

29(d) (2 marks)
Content: MM4
Outcomes assessed: MG2H-4
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Area of cross section : $A = \frac{1}{2}\pi(R^2 - r^2)$ $A = \frac{1}{2}\pi(2 \cdot 1^2 - 1 \cdot 9^2)$ $A = 1 \cdot 257 m^2$ Volume : $V = 1 \cdot 257 \times 2$ $V = 2 \cdot 51 m^3$	**1 mark** correct area of the cross section. **2 marks** correct solution.	2

29(e) (3 marks)
Content: AM1
Outcomes assessed: MGP-1
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$\frac{15-y}{3} = 10 - \frac{50+2y}{4}$ $4(15-y) = 120 - 3(50+2y)$ $60 - 4y = 120 - 150 - 6y$ $2y = -90$ $y = -45$	**1 mark** progress towards a correct solution by attempting to make a common denominator or equivalent. **2 marks** significant progress towards the correct solution with supporting calculations that include correct conversion to a common denominator or equivalent. **3 marks** for correct solution with supporting calculations. **NB 1 mark** for bald correct answer.	3

Question 30

30(a)(i) (1 mark)
Content: FSDr3
Outcomes assessed: MGP-5
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
70 km/h = 70 000 ÷ (60 × 60) m/s Distance = $\frac{70000}{60 \times 60} \times 1 \cdot 8$ = 35 metres.	**1 mark** correct solution.	1

30(a)(ii) (1 mark)
Content: FSDr3
Outcomes assessed: MGP-5
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Stopping distance = 35 + 23·8 = 58·8 metres.	**1 mark** for correct solution.	1

30(b)(i) (1 mark)
Content: FSHe1
Outcomes assessed: MG2H-7
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
The value of *r* indicates a strong positive relationship between daily calorie intake and BMI.	**1 mark** for correct statement.	1

30(b)(ii) (3 marks)
Content: FSHe1
Outcomes assessed: MG2H-7
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Gradient $= 0{\cdot}93 \times \frac{3{\cdot}08}{357{\cdot}77}$ $= 0{\cdot}008006261$ $\approx 0{\cdot}008$ Equation : $y = 0{\cdot}008x + 6{\cdot}23$	y-intercept $= 23{\cdot}84\text{-}0{\cdot}008\ldots \times 2\,200$ $= 6{\cdot}23$ **1 mark** for correct gradient. **1 mark** for correct y-intercept. **1 mark** for correct equation or any equation in this form using their incorrect values of gradient and/or y-intercept.	3

30(b)(iii) (1 mark)
Content: FSHe1
Outcomes assessed: MG2H-7
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
5 000 calories is too far removed from the calorie intake data used to establish the equation of this line or equivalent statement.	**1 mark** correct explanation.	1

30(c) (3 marks)
Content: FM4
Outcomes assessed: MG2H-6
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Number of days = 27 Interest on purchases : $\frac{0{\cdot}1349}{365} \times 450 \times 27 = 4{\cdot}49$ Interest on cash advance : $\frac{0{\cdot}2149}{365} \times 200 \times 27 = 3{\cdot}18$ Balance owing $= 650 + 3{\cdot}18 + 4{\cdot}49$ $= \$657{\cdot}57$ 5% of balance = 5% of \$657·57 = \$32·88 Kieran must pay \$35.00 to cover minimum monthly payment.	**1 mark** correct interest on purchases or correct interest on cash advances with no further progress towards solution. **2 marks** for calculating balance owing. **3 marks** for correct conclusion with supporting calculations of interest, balance and 5% of balance owing.	3

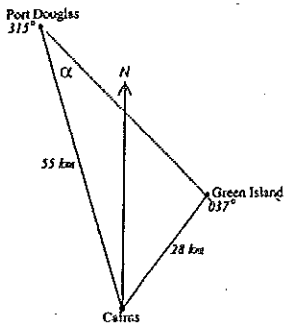
30(d)(i) (1 mark)
Content: MM5
Outcomes assessed: MG2H-4
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$\theta = 45 + 37$ $\theta = 82°$	**1 mark** correct answer.	1

30(d)(ii) (2 marks)
Content: MM5
Outcomes assessed: MG2H-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$d^2 = 55^2 + 28^2 - 2 \times 55 \times 28 \cos 82°$ $d^2 = 3380 \cdot 35$ $d = 58\,km$	**1 mark** correct substitution into Cosine rule. **2 marks** correct solution.	2

30(d)(iii) (2 marks)
Content: MM5
Outcomes assessed: MG2H-4
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
 $\frac{\sin\alpha}{28} = \frac{\sin 82°}{58}$ $\sin\alpha = 0 \cdot 478$ $\alpha = 29°$ Bearing : $180° - (45° + 29°) = 106°$	**1 mark** for correct value of α. **2 marks** correct bearing of Green Island from Port Douglas.	2