CSSA
CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW

Centre Number

Student Number

2014
TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics General 2

Morning Session
Thursday 31 July 2014

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 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 pages 13, 17, 22, 26 and 30

Total marks – 100

Section I Pages 2 - 11

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

Section II Pages 13 - 34

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

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 The weather forecast states that tomorrow will be an "extreme risk" day for bushfires.

Which of the following would represent the probability of an "extreme risk" event?

(A) 90%

(B) 75%

(C) 50%

(D) 30%

2 Patrick earns a fortnightly wage of $1 475·80.

What is Patrick's wage for one month to the nearest dollar?

(A) $2 952

(B) $3 162

(C) $3 198

(D) $3 276

3 Serafina wants to draw a radar chart to show the weekly attendance at dance classes over a 7-week term. Each arm of the chart represents one week.

What is the approximate size of the angle in each sector of the radar chart?

(A) 14·3°

(B) 25·7°

(C) 51·4°

(D) 52·1°

4 Simplify $3(x+4)-5(2x-3)$.

(A) $-7x-7$

(B) $-7x+27$

(C) $13x-3$

(D) $13x+27$

5 Maryam is driving at 80 kilometres per hour (km/h) when she sees a cyclist fall from his bike. Her reaction time is 1·8 seconds and her braking distance is 35 metres.

What is her stopping distance?

(A) 40·0 metres

(B) 63·0 metres

(C) 75·0 metres

(D) 79·4 metres

6 A set of scores is displayed in a stem and leaf plot.

Stem	Leaf		
1	6	6	9
2	4	8	
3	2	5	5
4	0	2	3

What is the median of this set of scores?

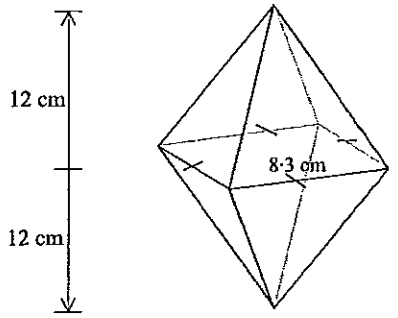
(A) 27

(B) 28

(C) 29

(D) 32

7 A square bipyramid consists of two identical square pyramids. The square base has an edge length of 8·3 centimetres and the perpendicular height of each pyramid is 12 centimetres.



NOT TO SCALE

Determine the volume of the square bipyramid in cubic centimetres, correct to 3 significant figures.

(A) 275

(B) 276

(C) 551

(D) 552

8 Researchers have found a correlation between the length of the legs of puppies and their running speed.
The means and standard deviations are shown below.

	Mean	Standard Deviation
Leg length	$\bar{x} = 10{\cdot}2$	$s_x = 1{\cdot}5$
Running speed	$\bar{y} = 1{\cdot}6$	$s_y = 2{\cdot}0$

The least-squares line of best fit is drawn and the gradient of this line is 0·4.

Which of the following is closest to the value of r, the correlation coefficient?

(A) 0·06

(B) 0·30

(C) 0·53

(D) 2·55

9 Which of the following represents the correct solution to this pair of simultaneous equations?

$$2x + y = 8$$
$$x - y = 1$$

(A) $x = 4$ and $y = 3$

(B) $x = 2$ and $y = 4$

(C) $x = 2$ and $y = 3$

(D) $x = 3$ and $y = 2$

10 In New Zealand, the goods and services tax (GST) is levied at 15%. Fiona purchased a camera for \$552 including the GST. At the airport, on her return home, she was permitted to claim a refund of the GST on goods purchased while in New Zealand.

How much was the refund that Fiona claimed?

(A) \$50·18

(B) \$55·20

(C) \$72·00

(D) \$82·80

11 Riley has a mobile phone plan which includes a data allowance of 1·5 gigabytes (GB) each month. The carrier charges excess usage fees of \$0·0195 per megabyte of usage over the allowance. Last month Riley used 1·87 GB of data.

Calculate, to the nearest cent, the amount he will need to pay for the excess usage.

(A) \$7·22

(B) \$7·39

(C) \$37·34

(D) \$73·88

12 Which of the following expressions is equivalent to $\frac{9d^4e^2 \times 2de^3}{15d^7e^5}$?

(A) $\frac{6}{5d^2}$

(B) $\frac{6e}{5d^2}$

(C) $\frac{3d^2}{5}$

(D) $3d^2$

13 Chloe purchases a new car for \$58 000. Stamp duty is calculated at 3% for the first \$45 000 plus an additional 5% for amounts in excess of \$45 000, based on the purchase price of the car.

How much stamp duty will Chloe need to pay?

(A) \$1 740

(B) \$2 000

(C) \$2 250

(D) \$2 900

14 Otto's monthly phone bill records the number of SMS messages and the cost as follows:

	Number of SMS messages	Cost per SMS
6 p.m.- 6 a.m. *"free time"*	25	free
6 a.m. – 6 p.m. Normal costs	135	25c per message

Which is the best approximation for the mean cost per SMS message?

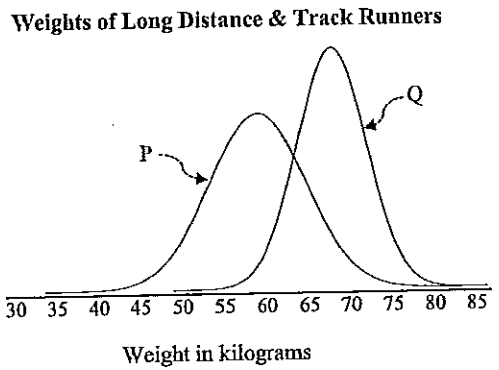
(A) 21 cents

(B) 25 cents

(C) 34 cents

(D) 3375 cents

15 Sam collects data from two groups of runners. Both sets of data are normally distributed and displayed in the graphs below. Graph P shows the weights in kilograms of the long distance running team members, and Graph Q shows the weights of the 100m track running team.



Which of the following statements is true?

(A) P has the greater standard deviation.

(B) P has the larger mode.

(C) The mean of P is greater than the mean of Q.

(D) Q is negatively skewed.

16 The present value (PV) of an investment is \$3 000. This money will earn 9·6% per annum interest, compounded monthly for the next 2 years.

Which of the following can be used to calculate the future value (FV) of this investment?

(A) $FV = 3000(1+0\cdot096)^2$

(B) $FV = 3000(1+0\cdot008)^2$

(C) $FV = 3000(1+0\cdot096)^{24}$

(D) $FV = 3000(1+0\cdot008)^{24}$

17

QUIET TIME POOL PUMPS	
Model	DF 746
Motor Power	1 200 watts
Retail Price	\$599·00

VHP ENERGY COMPANY	
Rates	
Off Peak	\$0·1929 / kWh
Peak	\$0·2649 / kWh

Jarrod purchases a Quiet Time Pool Pump. He operates the pump for 6 hours each day at the Off Peak rate.

How much will the pump add to his electricity costs for the period from 1 November to 31 December?

(A) \$70·60

(B) \$84·72

(C) \$85·16

(D) \$116·34

18 The drip rate is the amount of fluid (drops) an intravenous (IV) device delivers per minute. A swimmer on Bondi Beach is injured and requires 600 millilitres of pain relief fluid over 4 hours. The paramedics use an IV device that delivers 20 drops per millilitre.

What is the required drip rate?

(A) 3 drops/min

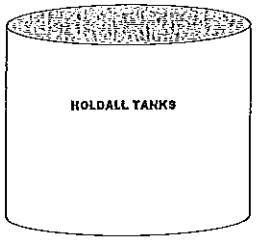
(B) 5 drops/min

(C) 50 drops/min

(D) 67 drops/min

19

HOLDALL TANKS	
Diameter width	920mm
Tank Height	1100mm
Features	New corrugated style 10 year full warranty UV Stabilised Material Polyethylene



Which of the following best describes the capacity of the cylindrical water tank?

(A) 700L

(B) 800L

(C) 2kL

(D) 3kL

20 Monique borrowed $5 000 from the bank to purchase equipment for her new dance studio. To help monitor her loan, she set up the following spreadsheet.

	A	B	C	D	E
1	Monique's Loan Repayments				
2	Monthly repayment		R =	$ 225.70	
3	Month	Principal (P)	Interest (I)	P+I	P+I-R
4	1	$ 5 000.00	$ 32.50	$ 5 032.50	$ 4 806.80
5	2	$ 4 806.80	$ 31.24	$ 4 838.04	$ 4 612.34
6	3	$ 4 612.34	$ 29.98	$ 4 642.32	$ 4 416.62
7	4	$ 4 416.62	$ 28.71	$ 4 445.33	$ 4 219.63
8	5	$ 4 219.63	$ 27.43	$ 4 247.06	$ 4 021.36
9	6	$ 4 021.36	$ 26.14	$ 4 047.50	$ 3 821.80

What is the annual interest rate on Monique's loan (to one decimal place)?

(A) 4·5% p.a.

(B) 6·5% p.a.

(C) 7·8% p.a.

(D) 14·4% p.a.

21 Which of the following would be most likely to have a negative correlation?

(A) The amount of alcohol consumed and the incidence of drink driving.

(B) The number of occupants in a household and the amount of electricity consumed.

(C) The number of mobile phones per household and the number of cars per household.

(D) The efficiency rating for an appliance and the amount of litres of water used by the appliance.

22 The formula $b^2 = a^2(e^2 - 1)$ is used to find the positive value of the eccentricity, e, of a hyperbola.

Which of the following correctly expresses e as the subject?

(A) $\sqrt{b^2 - a^2 + 1}$

(B) $\sqrt{\dfrac{b^2 + 1}{a^2}}$

(C) $\dfrac{b}{a} + 1$

(D) $\sqrt{\dfrac{b^2}{a^2} + 1}$

23 On Wednesday 18th June 2014, Spain played Chile in the 2014 FIFA World Cup™. The game commenced at 7:00pm in Rio de Janiero, Brazil (23°S, 43°W). Paul lives in Tamworth, Australia (31°S, 151°E). He streamed the match live on his computer.

What was the date and local time in Tamworth when the game commenced?

(A) 6:04am Wednesday 18th June.

(B) 11:48am Wednesday 18th June.

(C) 2:12am Thursday 19th June.

(D) 7:56am Thursday 19th June.

24 To overcome dehydration at the Australian Tennis Open a personal trainer recommends using a supplement called ProHidra. This is mixed at a rate of 12 milligrams per litre (mg/L) into a player's drinking water. The player uses 650 millilitre water bottles and averages 6 water bottles per match.

How many complete matches can be played using a 600mg container of ProHidra?

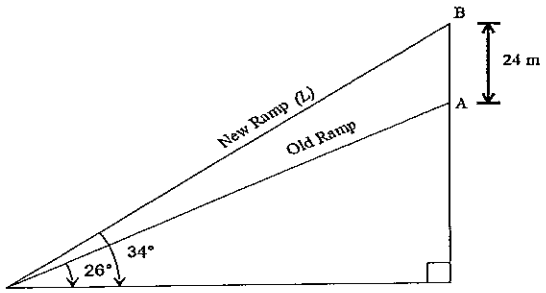
(A) 11

(B) 12

(C) 13

(D) 14

25 In preparation for the 2014 Winter Olympics in Sochi a ski ramp needed to be modified. When viewed from the bottom of the ramp, the top of the old ramp (A) was at an angle of elevation of 26°. After raising the ramp by 24 metres to B, as shown in the diagram, the angle of elevation of the top of the new ramp was measured as 34°.



NOT TO SCALE

Use the sine rule to find an expression for the length (L) of the new ramp.

(A) $L = \dfrac{24 \times \sin 116^\circ}{\sin 8^\circ}$

(B) $L = \dfrac{24 \times \sin 64^\circ}{\sin 8^\circ}$

(C) $L = \dfrac{24 \times \sin 116^\circ}{\sin 34^\circ}$

(D) $L = \dfrac{\sin 116^\circ}{24 \times \sin 8^\circ}$

CSSA

CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW
2014 TRIAL HIGH SCHOOL CERTIFICATE EXAMINATION

Centre Number

Student Number

Mathematics General 2

Section II

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

Answer each question in the space provided. All necessary working should be shown in every question.

Question 26 (15 marks) **Answer the questions in the spaces provided.**

(a) Thomas weighs 86 kilograms. He has consumed 6 standard drinks in 3 hours. Calculate his blood alcohol content (*BAC*). 1

.....

.....

.....

(b) According to Maria's mobile phone plan, she is allowed 2 gigabytes (GB) of data usage. After one year the phone company offers Maria a 10% increase in her data usage, and after two years they offer her a further 15% increase in her data usage.

(i) What is the overall percentage increase in Maria's data usage after two years? 1

.....

.....

.....

(ii) The original amount of data usage was calculated as 2·00 GB, correct to two decimal places. What is the percentage error in this calculation? 1

.....

.....

.....

Question 26 continues on page 14

Question 26 (continued)

(c) Robert travels 36 kilometres each way to and from his workplace. He works 5 days per week. The fuel consumption for Robert's car is 7·2 litres per 100 kilometres. 2

How many litres (L) of petrol does he use each week to travel to and from work?

.....

.....

.....

(d) The table shows the fortnightly ABSTUDY allowances available to independent indigenous students.

Category of eligibility	Maximum fortnightly payment
Single, no dependents	
less than 16 years old	$414·40
16-21 years old	$414·40
Less than 16 years old, at home	$226·80
16-17 years old, at home	$226·80
18-21 years old, at home	$272·80
22 to less than 60 years old	$501·00
aged 60 years old or more	$542·10
Partnered, no dependents	
Less than 16 years old	$414·40
16-21 years old	$414·40
22 years old or more	$452·30
Single, with dependent children	
Less than 16 years old	$542·90
16-21 years old	$542·90
22 years old or more	$542·10
Partnered, with dependent children	
Less than 16 years old	$455·00
16-21 years old	$455·00
22 years old or more	$452·30

Source : Australian Government Department of Human Services

Karen and John are indigenous students who recently married. John is 22 years old and Karen is 20. They have no dependent children. 2

Calculate their combined maximum fortnightly allowance.

.....

.....

Question 26 continues on page 15

Question 26 (continued)

(e) The cost function for making n pizzas is given by $C = 10n + 800$ where C is in dollars ($).

(i) What does 800 represent in this formula? 1

.....

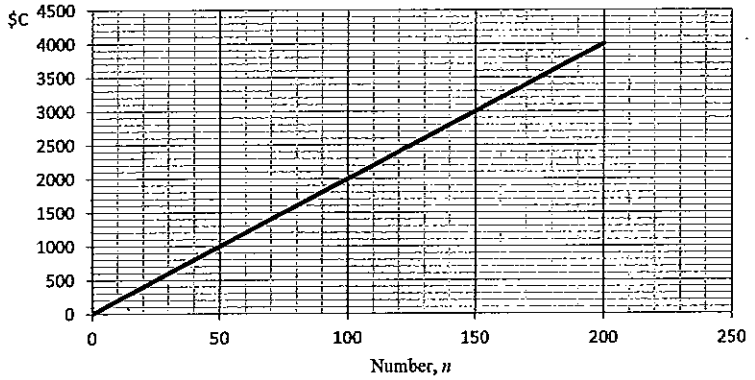
.....

.....

(ii) Complete the table for the cost of making the pizzas. 1

Number of pizzas (n)	0	50	100	150
Cost ($C)				

Each pizza sells for $20. The income function for selling n pizzas is shown on the graph below.



(iii) On the same axes, graph the cost of making pizzas, $C = 10n + 800$. 1

(iv) Write down the point of intersection of the two lines. 1

.....

(v) Explain the meaning of this point of intersection in terms of pizza production. 1

.....

.....

.....

Question 26 continues on page 16

Question 26 (continued)

(f) Matthew purchases a packet of 20 tablets for the treatment of his stomach cramps. Each tablet contains 10mg of hyoscine butylbromide as the active ingredient.
The dosage instructions are as follows:

> FREECRAMP
>
> For adults and children over 6 years.
>
> Take 2 tablets four times a day.
>
> Tablets should be swallowed whole with fluid.
> If symptoms persist after 48 hours stop taking medication and consult a physician.

(i) How many doses are in the packet? 1

.....

.....

(ii) Large amounts of the active ingredient, hyoscine butylbromide, can cause side effects. 1

What is the largest recommended amount of this active ingredient, (in mg), that a person should take before consulting their doctor?

.....

.....

.....

(iii) Matthew returned from the chemist at 9 am on Saturday and immediately took his first dose. He followed the directions stated and after 3 doses, the stomach cramps had stopped. Matthew does not take any further medication. 1

What was the day and time of his last dose?

.....

.....

End of Question 26

Centre Number

Student Number

Question 27 (15 marks) **Answer the questions in the spaces provided.**

(a) Solve the equation $\frac{5x+2}{3} = 4 - 2x$. 2

.....

.....

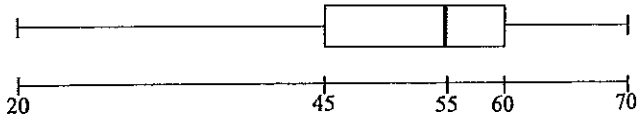
.....

.....

.....

.....

(b) Nathalie created this box and whisker plot from data that she had collected. 2



She said that the lowest score was an outlier.

Is Nathalie correct? Justify your answer with appropriate calculations.

.....

.....

.....

.....

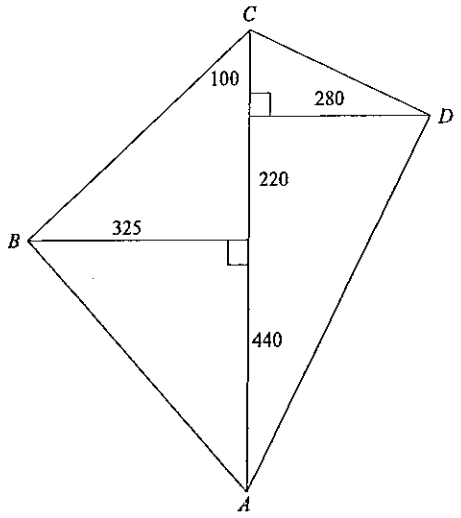
.....

.....

Question 27 continues on page 18

Question 27 (continued)

(c) Ken surveys a fenced paddock on his farm using two different methods. Firstly, Ken completes a traverse survey as shown in the diagram below. All the dimensions are in metres.



(i) Complete the missing values in the field diagram below : 1

	C	
	760	
	.....	280 D
B	440	
	0	
	A	

(ii) Find the length of the side AB correct to one decimal place. 1

.....

.....

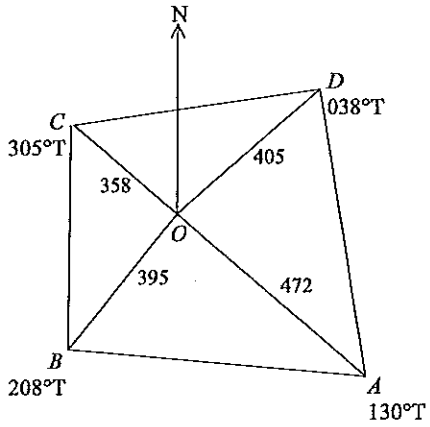
.....

.....

Question 27 continues on page 19

Question 27 (continued)

Ken's second survey is a compass radial survey shown below. All measurements are in metres.



(iii) Explain why $\angle BOA = 78°$. 1

.....

.....

.....

(iv) Use the cosine rule to calculate the length of the side fence AB. Give your answer correct to one decimal place. 2

.....

.....

.....

.....

.....

.....

(v) Give an explanation for the difference in your answers to (ii) and (iv) for the length of the side fence AB using the two different survey methods. 1

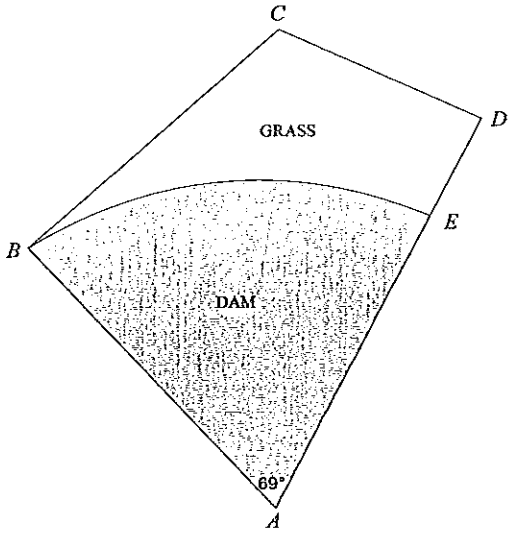
.....

.....

.....

Question 27 continues on page 20

Ken wishes to construct a new dam in this paddock. He uses his traverse survey measurements as a guide. The dam is in the shape of a sector as shown in the shaded part of this diagram.



(vi) If $AB = AE$ and $\angle BAE = 69°$, find the area of the dam, correct to 2 significant figures. 2

.....

.....

.....

.....

.....

.....

Question 27 continues on page 21

(d) Tory and Ryan are building a new house and their home loan of $400 000 has been approved. The bank has offered them two options for their loan.

Option A : Repay the loan with a variable interest rate commencing at 4·90% per annum.	***Option B :*** Repay the loan with a fixed interest rate of 5·05% per annum with this rate locked in for 3 years.

The monthly repayments required for various loan amounts and interest rates are shown in the table below.

Monthly home loan repayments						
Rate (% pa)	**4·85%**	**4·90%**	**4·95%**	**5·00%**	**5·05%**	**5·10%**
$350 000	$2 016	$2 026	$2 036	$2 046	$2 056	$2 067
$400 000	$2 304	$2 315	$2 327	$2 338	$2 350	$2 362
$450 000	$2 591	$2 605	$2 618	$2 631	$2 644	$2 657

(i) Use the table to calculate the difference in the initial monthly repayments between ***Option A*** and ***Option B***. 1

.....

.....

Some of the additional fees and charges which may be imposed by their bank are listed below :

Application and establishment fee	**$945**
Loan service and administration charges	**$7·50 per month**

Customers are required to pay all the relevant additional fees and charges with their first month's repayment.

(ii) If Tory and Ryan choose ***Option A***, calculate the total cost of their first month's repayment. 1

.....

.....

.....

(iii) The loan is designed to be repaid over 30 years. At the present interest rate, what is the total interest to be paid on the ***Option A*** loan? 1

.....

.....

.....

End of Question 27

BLANK PAGE

Centre Number

Student Number

Question 28 (15 marks) Answer the questions in the spaces provided.

(a) Data is collected for the times on a long distance fun run. The times are found to be normally distributed and the results are given as z-scores.

(i) In this data Kyle has a z-score of $-1{\cdot}8$. **2**

Explain in words how this z-score is related to the mean and standard deviation of the data.

.....

.....

.....

.....

(ii) The data for the times has a mean of 58 minutes and a standard deviation of 8. Hugo ran the course in 70 minutes. **1**

What is Hugo's z-score?

.....

.....

.....

(iii) There were 2 075 runners in the fun run. **2**

How many of the runners had times 50 minutes or below?

.....

.....

.....

(b) Joshua buys a new car for \$18 560. He sells it 5 years later for \$6 900. **2**

Calculate the rate of depreciation, r, on Joshua's car using the declining balance method.

.....

.....

.....

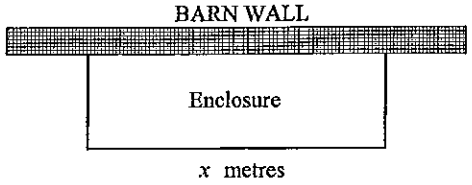
.....

.....

Question 28 continues on page 24

Question 28 (continued)

(c) A farmer has 8 metres of fencing and wants to construct a rectangular hen enclosure with the greatest possible area. One side of the enclosure is an existing barn wall and does not need to be fenced.



The farmer calculates the formula for the area, (A), of the enclosure to be:

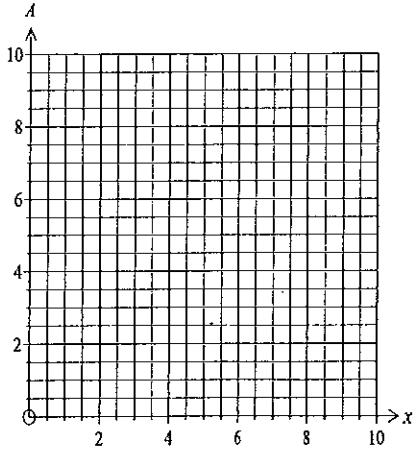
$$A = 4x - \frac{x^2}{2}$$

where x is the length of the enclosure in metres.

(i) Complete the table of values. 1

Length x (m)	0	1	2	3	4	5	6	7	8
Area A (m^2)		3·5		7·5			6		

(ii) Sketch the graph of $A = 4x - \frac{x^2}{2}$ using the grid provided below. 1



Question 28 continues on page 25

Question 28 (continued)

(iii) What is the greatest possible area for the enclosure? 1

.....

.....

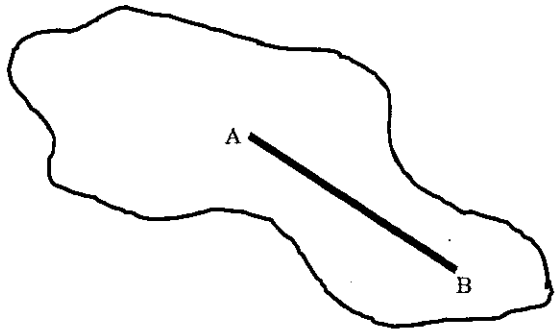
(iv) What are the dimensions of the enclosure that will give the greatest possible area? 1

.....

.....

.....

(d) A small private island has an airstrip that is 1 800 metres in length. The line AB on the diagram below represents a scale drawing of the airstrip.



Calculate the scale used in the diagram. Give your answer in the form 1 : X. 2

.....

.....

.....

.....

.....

.....

Question 28 continues continues on page 26

Question 28 (continued)

(e) The table below gives the future value of an annuity for every contribution of $1 per period. **2**

Future value interest factors
Future value of an annuity with a contribution of $1 at the end of each period

Period	Interest rate per period								
	1%	2%	3%	4%	5%	6%	8%	10%	12%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0800	2.1000	2.1200
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2464	3.3100	3.3744
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.5061	4.6410	4.7793
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.8666	6.1051	6.3528
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.3359	7.7156	8.1152
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.9228	9.4872	10.0890
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.6366	11.4359	12.2997
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	12.4876	13.5795	14.7757
10	10.4622	10.9497	11.4639	12.0061	12.5779	13.1808	14.4866	15.9374	17.5487
11	11.5668	12.1687	12.8078	13.4864	14.2068	14.9716	16.6455	18.5312	20.6546
12	12.6825	13.4121	14.1920	15.0258	15.9171	16.8699	18.9771	21.3843	24.1331

Sarah is planning an extended overseas trip and has a savings goal of $25 000. Her bank offers an account with interest paid quarterly at a rate of 8% per annum.

Use the table to determine, to the nearest dollar, how much Sarah will need to contribute to the account at the end of each quarter in order to reach her goal in 3 years.

.....

.....

.....

.....

.....

End of Question 28

Centre Number

Student Number

Question 29 (15 marks) **Answer the questions in the spaces provided.**

(a) During July, police conducted a random breath testing campaign at a particular location. The blood alcohol content *(BAC)* for male and female drivers tested is shown in the table below.

	Male	Female	Total
BAC less than 0·05	2 301	1 572	
BAC greater than 0·05	59		
Total		1 618	

(i) Complete the table to include the number of females with a *BAC* greater than 0·05 and all totals. **1**

(ii) A driver is chosen at random from the male drivers tested. **1**

What is the probability that he will have a *BAC* less than 0·05?

.....

.....

(iii) Based on the information in the table, would you consider male drivers to be more likely than female drivers to have a *BAC* greater than 0·05? Justify your answer. **2**

.....

.....

.....

.....

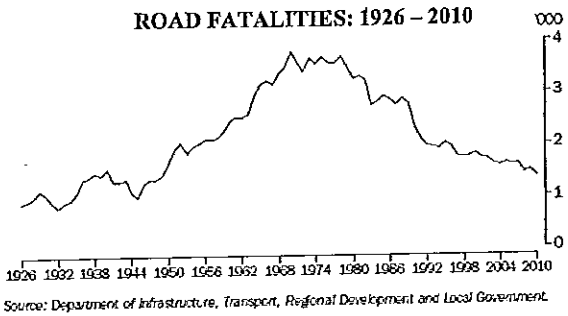
.....

.....

.....

Question 29 continues on page 28

(b) Australian Road Fatalities (deaths) for the period 1926 to 2010 are shown below.



Source: Department of Infrastructure, Transport, Regional Development and Local Government.

(i) Road fatalities peaked in 1970 at 3 798 deaths. By 2010 the number of fatalities was 36% of the 1970 figure. 1

Calculate how many road deaths occurred in 2010.

.....

.....

.....

(ii) Random Breath Testing (RBT) was introduced in Australia in 1976. 1

Use the information in the graph to explain how RBT may have had an impact on the number of road fatalities between 1976 and 2010.

.....

.....

.....

.....

(iii) In 1970 the number of road deaths in Australia was 3 798. The number of fatalities per 100 000 people in 1970 was 30·4. 2

Use this information to calculate the approximate size of the population in Australia in 1970 to the nearest 1 000.

.....

.....

.....

Question 29 continues on page 29

(c) The time, t hours, taken to travel in a car from Sydney to Melbourne varies inversely with the average speed, s kilometres per hour (km/h), of the car. The trip takes 11 hours travelling at an average speed of 80 km/h.

(i) Find the equation for time, t, that models this relationship. 2

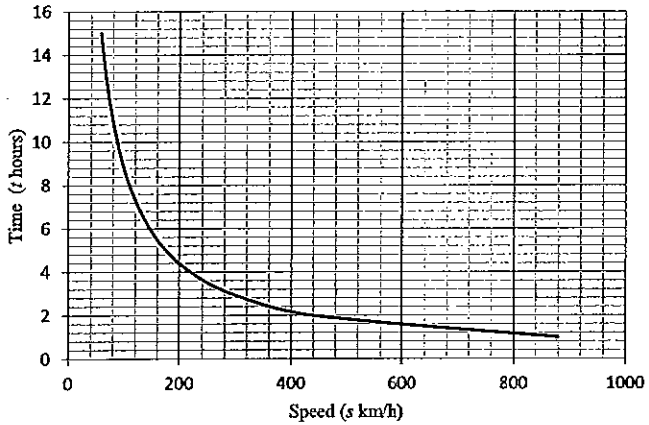
.....

.....

.....

.....

This relationship is shown on the graph below.



(ii) How much shorter would the trip be if the average speed was increased to 100 km/h? Give your answer in hours and minutes. 1

.....

.....

.....

(iii) Discuss the limitations of the graph for large values of s. 1

.....

.....

.....

Question 29 continues on page 30

Question 29 (continued)

(d) Katie has been comparing the interest rates, terms and conditions for credit cards offered by different financial institutions. She is considering the four options shown in the table below:

Financial Institution	Interest Rates per annum		Annual fee	Interest free period
	purchases	cash advances		
Firstbank	13·49%	21·49%	$45	55 days
Nextbank	11·99%	21·99%	$59	55 days
Thisbank	19·74%	21·49%	$0	40 days
Thatbank	11·99%	20·99%	$58	45 days

Katie plans to use her card for purchases and only pay the minimum monthly payment each month. She will not be using her card for cash advances.

Select the card which would be most suitable for Katie. Explain why you have chosen that particular card. **1**

.....

.....

.....

.....

(e) Under certain conditions, braking distance of a vehicle can be calculated using the formula **2**

$$d = \frac{V^2}{168}$$

where d is the braking distance in metres and V is the speed of the vehicle in kilometres per hour. Mohammed claims that if you double your speed then you double your braking distance.

Is Mohammed correct? Justify your answer with mathematical calculations.

.....

.....

.....

.....

.....

.....

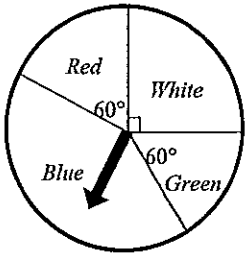
End of Question 29

Centre Number

Student Number

Question 30 (15 marks) Answer the questions in the spaces provided.

(a) A game is designed using a spinner as shown in the diagram. Each game consists of one spin and the arrow points to the winning colour.



(i) In any single game, what is the probability that the winning colour is blue? **1**

.....

.....

(ii) If the arrow finishes on white, the player wins $6. If it lands on red or green the player wins $12. The player loses $6 if the result of the spin is blue. **2**

Calculate the financial expectation of one game.

.....

.....

.....

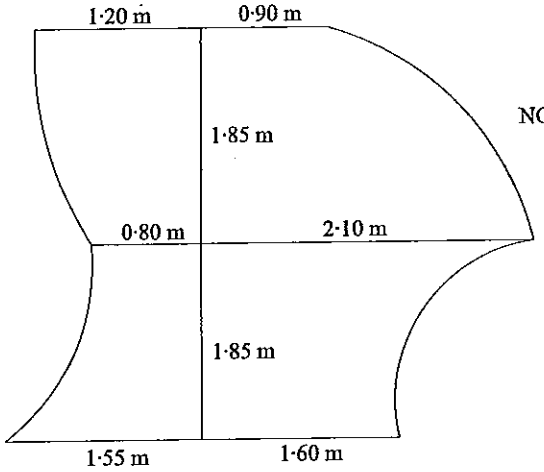
.....

.....

.....

Question 30 continues on page 32

(b) At the local preschool they have decided to purchase new synthetic grass flooring for a section of the playground shown in the diagram.



NOT TO SCALE

(i) Use two applications of Simpson's rule to approximate the area of the floor. Give your answer in square metres to 2 decimal places. **2**

.....

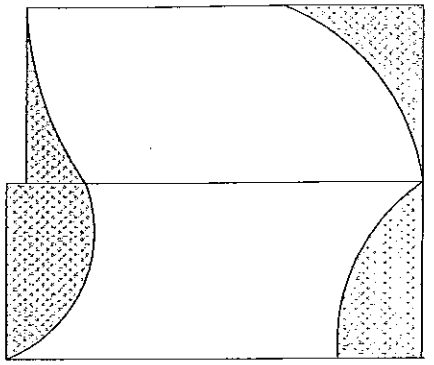
.....

.....

.....

Question 30 continues on page 33

The preschool is investigating the cost of synthetic grass flooring. The flooring is available in rolls that are 1·85 metres wide. The cost is $59·95 per metre.
The flooring is to be laid in two sections as shown below:



Wastage

(ii) What is the total cost for flooring the playground? **2**

.....

.....

.....

.....

(iii) The director of the preschool is concerned about costs and wishes to have as little wastage as possible. She will not use the synthetic grass if more than 20% of the purchased grass is wasted. **2**

What decision will the director make? Justify your answer using mathematical calculations.

.....

.....

.....

.....

Question 30 continues on page 34

Question 30 (continued)

(c) On 21 January 2014, Michael used his credit card to purchase $1 350 worth of camping gear. The terms of Michael's card are :

- No interest free period
- Minimum payment of 2% of the balance owing or $25, whichever is greater
- Simple interest is calculated daily on a period which includes the date of purchase and the date of payment.
- The interest rate for purchases is 13·49% per annum.

(i) Michael made no further purchases on the card. **2**

How much interest will Michael be charged on this purchase if his account payment is to be made on 15 February 2014?

.....

.....

.....

.....

(ii) What is the minimum payment due on 15 February 2014? **1**

.....

.....

(d) The city of Bratislava in Slovakia is located at (48°N, 17°E). Windhoek in Namibia lies on the same meridian of longitude and is 7 930 km south of Bratislava.

Find the coordinates for the latitude and longitude of Windhoek.
You may assume the radius of the Earth to be 6 400 kilometres. **3**

.....

.....

.....

.....

.....

End of paper

BLANK PAGE

CSSA

CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW
2014 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS GENERAL 2
MARKING GUIDELINES/SOLUTIONS

Section 1
25 marks
Questions 1 – 25 (1 mark each)

Question	Answer	Content	Syllabus Outcomes	Targeted Performance Bands
1	A	PB1 Relative frequency and probability	MGP-8	2-3
2	C	FM1 : Earning and managing money	MGP-6	2-3
3	C	DS2 : Displaying and interpreting single data sets	MGP-5	2-3
4	B	AM1 : Algebraic manipulation	MGP-3	3-4
5	C	FSDR3 : Safety	MGP-3	2-3
6	D	DS3 : Summary statistics	MGP-7	2-3
7	C	MM4 : Further applications of area and volume	MG2H-4	2-3
8	B	FSHe1 : Body measurements	MG2H-2	2-3
9	D	AM3 : Further algebraic skills and techniques	MG2H-3	3-4
10	C	FM3 : taxation	MGP-6	2-3
11	B	FSCO2 : digital download and file storage	MGP-5	3-4
12	A	AM3 : Further algebraic skills and techniques	MG2H-3	3-4
13	B	FSDr1 : costs of purchase and insurance	MGP-5	3-4
14	A	DS3 : Summary statistics	MGP-7	3-4
15	A	DS4 : Interpreting sets of data	MG2H-2	3-4
16	D	FM4 : Credit and borrowing	MG2H-6	3-4
17	B	FSRe3 : Energy and sustainability	MG2H-2	4-5
18	C	FSHe2 : Medication	MG2H-2, MG2H-5	3-4
19	A	FSRe1 : Water availability and usage	MG2H-5	4-5
20	C	FM5 : Annuities and loan repayments	MG2H-6	4-5
21	D	FSHe1 : Body measurements	MG2H-2, MG2H-7	3-4
22	D	AM3 : Further algebraic skills and techniques	MG2H-6	4-5
23	D	MM6 : Spherical geometry	MG2H-4	4-5
24	B	MM1 : Units of measurement and applications	MGP-5	5-6
25	A	MM5 : Applications of trigonometry	MG2H-4	5-6

Section II
Question 26

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

Solution	Criteria	Marks
$BAC_{male} = \dfrac{10N - 7{\cdot}5H}{6{\cdot}8M}$ $BAC_{male} = \dfrac{10\times 6 - 7{\cdot}5\times 3}{6{\cdot}8\times 86}$ $= 0{\cdot}064124487....$ Thomas has a BAC of 0·064 (to 3 decimal places)	1 mark for correct answer	1

26(b) (i) (1 mark)
Content: FSCo2
Outcomes Assessed: MGP-5
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
$1{\cdot}10\times 1{\cdot}15 = 1{\cdot}265$ $1{\cdot}265 - 1{\cdot}0 = 0{\cdot}265$ The overall percentage increase is 26·5%	1 mark for correct answer	1

26(b)(ii) (1 mark)
Content: MM1
Outcomes Assessed: MGP-5
Targeted Performance Bands: 2 - 3

Solution	Criteria	Marks
Absolute error $= \pm 0{\cdot}005$ GB Percentage error $= \dfrac{0{\cdot}005}{2{\cdot}00}\times 100$ $= 0{\cdot}25\%$	1 mark for correct answer	1

26(c) (2 marks)
Content: MM1
Outcomes assessed: MGP-5
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Total distance travelled $= 36 \times 2 \times 5$ $= 360\,km$ Litres of petrol used $= 3 \cdot 6 \times 7 \cdot 2$ $= 25 \cdot 92\,L$	**2 marks** for correct solution **1 mark** for correct consumption from incorrect distance calculation.	2

26(d) (2 marks)
Content: FM1
Outcomes assessed: MGP-6
Targeted Performance Bands: 2-3.

Solution	Criteria	Marks
Combined fortnightly allowance = \$452·30 + \$414·40 = \$866·70	**2 marks** for correct answer **1 mark** : 1 correct value from table added to 1 incorrect value from table. or **1 mark** : two correct values from table *not* added to get combined allowance.	2

26(e) (i) (1 mark)
Content: AM2
Outcomes assessed: MGP-10
Targeted Performance Bands: 2-3

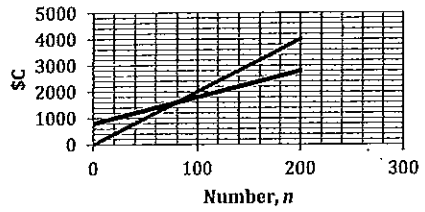
Solution	Criteria	Marks
800 represents the costs incurred (eg initial costs to buy equipment) regardless of the number of pizzas made.	**1 mark** for reasonable remarks	1

26(e) (ii) (1 mark)
Content: AM2
Outcomes assessed: MGP-2
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
	1 mark for all answers correct	1

Number of pizzas (n)	0	50	100	150
Cost (C)	800	1300	1800	2300

26(e) (iii) (1 mark)
Content: AM4
Outcomes assessed: MG2H-3
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
	**1 mark** for correctly plotting values obtained	1

26(e) (iv) (1 mark)
Content: AM2
Outcomes assessed: MGP-3
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
(80,1600)	**1 mark** for correct coordinates	1

26(e) (v) (1 mark)
Content: AM4
Outcomes assessed: MG2H-3, MG2H-10
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
This is the break-even point which indicates that 80 pizzas need to be sold before any profit is made.	**1 mark** for statement that has some mention of 80 pizzas	1

26 (f)(i) (1 mark)
Content:FSHe2
Outcomes Assessed:MG2H-2
Targeted Performance Bands: 2 - 3

Solution	Criteria	Marks
One dose is 2 tablets. The packet contains 20 tablets, so it has 10 doses in it	**1 mark** for the correct answer	1

26 (f)(ii) (1 mark)
Content: FSHe2
Outcomes Assessed:MG2H-5
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
8 tablets = 24 hours 16 tablets = 48 hours $10 \times 16 = 160$ mg Largest recommended dose is 160 mg.	**1 mark** for the correct answer	1

26 (f)(iii) (1 mark)
Content: FSHe2
Outcomes Assessed:MG2H-5
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
1st dose 9am Saturday 2nd dose 3pm Saturday 3rd dose 9pm Saturday	**1 mark** for the correct answer	**1**

Question 27

27(a) (2 marks)
Content: AM3
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\frac{5x+2}{3}=4-2x$ $5x+2=12-6x$ $11x=10$ $x=\frac{10}{11}$	**2 marks** for correct solution (regardless of any rounding) **1 mark** for correct multiplication and some attempt to collect like terms.	**2**

27(b) (2 marks)
Content:DS4
Outcomes assessed: MG2H-1, MG2H-2
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
An outlier will be a score less than $Q_L-1.5\times IQR$ $IQR=60-45$ $=15$ *Outlier* $<45-1\cdot5\times15$ $=22\cdot5$ So 20 is an outlier because it is less than $22\cdot5$.	**2 marks** for correct answer with justification that includes a calculation of $Q_L-1.5\times IQR$ **1 mark** for progress towards correct answer which includes an attempt to calculate $Q_L-1.5\times IQR$	**2**

27 (c) (i) (1 mark)
Content: MM2
Outcomes Assessed:MGP-4
Targeted Performance Bands: 2 - 3

Solution	Criteria	Marks
Missing values are 325, 660	**1 mark** for correct answer	**1**

27 (c)(ii) (1 mark)
Content: MM3
Outcomes Assessed:MGP-4
Targeted Performance Bands: 2 - 3

Solution	Criteria	Marks
$AB^2=325^2+440^2$ $=299225$ $\therefore AB=547\cdot0$ Correct to one decimal place	**1 mark** for correct answer	**1**

27 (c)(iii) (1 mark)
Content: MM5
Outcomes Assessed:MG2H-4
Targeted Performance Bands: 2 - 3

Solution	Criteria	Marks
$\angle BOA=208^0-130^0$ $=78^0$	**1 mark** for correct answer	**1**

27 (c)(iv) (2 marks)
Content: MM5
Outcomes Assessed:MG2H-4
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
$AB^2=395^2+472^2-2\times395\times472\times\cos78^0$ $=301282\cdot8887...$ $AB=548\cdot9 metres$ Correct to one decimal place	**2 marks** for the correct answer **1 mark** for correct substitution into the cosine rule	**2**

27 (c)(v) (1 mark)
Content: FSRe2
Outcomes Assessed:MG2H-4
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
Both surveys required measurements which lead to error and different results for the same length *AB*.	**1 mark** for correct answer	1

27 (c)(vi) (2 marks)
Content: MM4
Outcomes Assessed:MG2H-4
Targeted Performance Bands: 3 - 4

Solution	Criteria	Marks
Area of a sector $= \frac{69^0}{360^0} \times \pi \times 547^2$ $= 180165 \cdot 286....$ $= 180000 m^2$ Correct to 2 significant figures	**2 marks** for the correct answer **1 mark** for correct substitution into the sector formula (ignore rounding errors)	2

27(d) (i) (1 mark)
Content: FM5
Outcomes assessed: MG2H-5
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Difference in repayments = \$2 350 - \$2 315 = \$35	**1 mark** for correct answer	1

27(d) (ii) (1 mark)
Content: FM5
Outcomes assessed: MG2H-6
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Total payment = \$2 315 + \$945 + \$7·50 = \$3 267·50	**1 mark** for correct answer	1

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

Solution	Criteria	Marks
Total interest = \$2 315 × 30 × 12 − 400 000 = \$433 400	**1 mark** for correct answer	1

Question 28

28(a) (i) (2 marks)
Content: DS5
Outcomes assessed: MG2H-7
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Kyle's score lies 1·8 standard deviations below the mean.	**2 marks** for using both 1.8 standard deviations as well as *below* the mean. **1 mark** for making reference to 1.8 standard deviations.	2

28(a) (ii) (1 mark)
Content: DS5
Outcomes assessed: MG2H-7
Targeted Performance Bands: .2 - 3

Solution	Criteria	Marks
$z = \frac{70-58}{8}$ $= 1 \cdot 5$	**1 mark** for correct answer.	1

28(a) (iii) (2 marks)
Content: DS5
Outcomes assessed: MG2H-7
Targeted Performance Bands: 4 – 5

Solution	Criteria	Marks
As 50 is 1 standard deviation below the mean, Number of runners $= (50-34)\%\ of\ 2075$ $= 16\%\ of\ 2075$ $= 332$	**2 marks** for correct answer **1 mark** for recognizing 50 as 1 standard deviation below the mean. or **1 mark** for using 16%	2

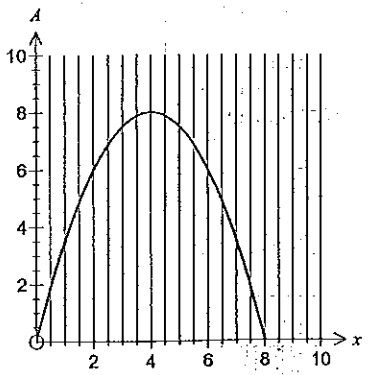
28(b) (2 marks)
Content: FSDr2
Outcomes assessed: MGP-3, MG2H-3
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$S = V_0(1-r)^n$ $6900 = 18560(1-r)^5$ $(1-r)^5 = \frac{6900}{18560}$ $1-r = \sqrt[5]{\frac{6900}{18560}}$ $1-r = 0{\cdot}8204539756...$ $r = 0{\cdot}1795460244...$ The rate of depreciation is 17.95% (to 2 decimal places)	**2 marks** for correct answer **1 mark** for a correct substitution of all relevant values into the correct formula	2

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

Solution										Criteria	Marks
Length x (m)	0	1	2	3	4	5	6	7	8	**1 mark** for correct values	1
Area A (m^2)	*0*	3·5	*6*	7·5	*8*	*7·5*	6	*3·5*	*0*		

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

Solution	Criteria	Marks
	**1 mark** for correct curve	1

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

Solution	Criteria	Marks
Greatest area is 8 m^2	**1 mark** for correct answer	1

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

Solution	Criteria	Marks
Dimensions 4 metres by 2 metres	**1 mark** for correct answer	1

28(d) (2 marks)
Content: MM3
Outcomes assessed: MGP-5
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
AB measures 45 mm. 45 mm : 1 800 m 45 : 1 800 000 1 : 40 000	**2 marks** for correct answer **1 mark** any correct ratio *not* in the form 1 : X	2

28(e) (2 marks)
Content: FM5
Outcomes assessed: MG2H-7
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
3×4 = 12 quarters 8% pa = 2% per quarter From the table, Sarah accrues a future value of **13.4121** per $1. contribution per quarter $= \$25\,000 \div 13{\cdot}4121$ $= 1863{\cdot}988488$ She must contribute $1 864 per quarter (to the nearest dollar)	**2 marks** for correct answer **1 mark** for any incorrect answer which correctly reads the value ***13·4121*** from the table.	2

Question 29

29(a) (i) (1 mark)
Content: DS4
Outcomes assessed: MG2H-7
Targeted Performance Bands: 2-3

Solution				Criteria	Marks
	Male	Female	Total	1 mark for table with all correct values.	1
BAC less than 0·05	2 301	1 572	*3 873*		
BAC greater than 0·05	59	*46*	*105*		
Total	*2 360*	1 618	*3 978*		

29(a) (ii) (1 mark)
Content: PB2
Outcomes assessed: MG2H-8
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$P(\text{male}<0{\cdot}05) = \frac{2301}{2360}$ $= 0{\cdot}975 \text{ or } \frac{39}{40}$	1 mark for correct answer	1

29(a) (iii) (2 marks)
Content: PB2
Outcomes assessed: MG2H-8, MG2H-10
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$P(\text{male} > 0{\cdot}05) = 0{\cdot}025$ $P(\text{female} > 0.05) = \frac{46}{1618} = 0{\cdot}02843016069\ldots$ The figures suggest that a female is more likely to have a *BAC* > 0·05.	**2 marks** for correct solution containing appropriate calculations of the probabilities needed to support the statement. The statement should reference these calculations. **1 mark** correctly calculating the probabilities relating to male and female drivers. **0 marks** should be awarded for a bald statement with no calculations.	2

29(b) (i) (1 mark)
Content: FSdr1, DS1, DS2
Outcomes assessed: MGP-5
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
36% *of* 3798 = 1367·28 = 1367 people	1 mark for correct answer	1

29(b) (ii) (1 mark)
Content: DS2
Outcomes assessed: MGP-2, MGP-7
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
The general trend of the graph is downwards after 1976, so fatalities have declined.	1 mark for correct answer	1

29(b) (iii) (2 marks)
Content: FSDr3, DS6
Outcomes assessed: MG2H-2
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$\frac{3798}{P} = \frac{30 \cdot 4}{100\,000}$ $P = 12\,493\,421.05$ $P = 12\,493\,000$ $\therefore$ population is 12 493 000 to the nearest 1000.	**2 marks** for correct answer **1 mark** for significant progress towards the answer, using ratios, unitary method or capture-recapture method.	**2**

29(c) (i) (2 marks)
Content: AM5
Outcomes assessed: MG2H-3
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$t = \frac{k}{s}$ $11 = \frac{k}{80}$ $k = 880$ So equation is $t = \frac{880}{s}$	**2 marks** for correct answer in correct form **1 mark** for correct value of k or significant progress towards answer	**2**

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

Solution	Criteria	Marks
At 100km/h, $t = 8 \cdot 8$ hours Time saved $= 11 - 8 \cdot 8$ $= 2 \cdot 2$ hours $= 2h\ 12m$	**1 mark** for correct answer in hours and minutes	**1**

29(c) (iii) (1 mark)
Content: AM5
Outcomes assessed: MG2H-3, MG2H-10
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
As s increases, t decreases. However, cars are limited by physical constraints as to how quickly they can travel, so for larger values of s the graph is meaningless.	**1 mark** for reasonable discussion.	**1**

29(d) (1 mark)
Content: FM4
Outcomes assessed: MG2H-6, MG2H-10
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Katie should choose the Nextbank card as it has the same lower interest rate as Thatbank but gives her 10 more interest free days.	**1 mark** for a correct response which references the combination of the *lowest interest rate* with the *longer interest free period* as the deciding factor.	**1**

29(e) (2 marks)
Content: FSDr3
Outcomes assessed: MGP-10, MGP-3
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$d = \frac{V^2}{168}$ *numerical substitution :* e.g. $V = 20$ $\quad$ $V = 40$ $d = \frac{20^2}{168}$ $\quad$ $d = \frac{40^2}{168}$ $d = 2{\cdot}38....$ $\quad$ $d = 9{\cdot}52....$ or *algebraic method :* If V is doubled, $d = \frac{(2V)^2}{168}$ $= \frac{4V^2}{168}$ Conclusion : Mohammed is *not* correct as the distance is multiplied by 4 not 2.	**2 marks** for a correct solution which includes numerical calculations for 2 speeds (one of which is double the other). The solution must also reference this calculation in stating an accurate conclusion. **1 mark** for two correct calculations or correct algebraic method with *no* concluding statement. or **1 mark** for a concluding statement which is correct for the candidate's incorrect calculations. **0 marks** for bald statement without calculations.	**2**

Question 30

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

Solution	Criteria	Marks
P(blue) $= \frac{150}{360} = \frac{5}{12}$	**1 mark** for correct numerical expression	**1**

30(a) (ii) (2 marks)
Content: PB2
Outcomes assessed: MG2H-8
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Financial expectation $= \frac{1}{4}\times 6 + \frac{1}{6}\times 12 + \frac{1}{6}\times 12 - \frac{5}{12}\times 6$ $= \$3{\cdot}00$	**2 marks** for correct solution **1 mark** for progress towards a correct solution which contains no more than one error in calculating the probabilities or **1 mark** for a solution in which the only error is + in place of – for the loss. **Note:** Should a student acknowledge that the financial expectation may include the cost of playing the game then they should not be penalised. e.g. ANS : \$3·00 – cost of game.	**2**

30 (b)(i) 2 marks
Content: MM4
Outcomes Assessed:MG2H-5
Targeted Performance Bands: 5 - 6

Solution	Criteria	Marks
$A = \frac{1{\cdot}85}{3}\{1{\cdot}55 + (4\times 0{\cdot}80) + 1{\cdot}20\} + \frac{1{\cdot}85}{3}\{1{\cdot}60 + (4\times 2{\cdot}10) + 0{\cdot}90\}$ $= 10{\cdot}39 \text{metres}^2$	**2 marks** for the correct answer **1 mark** for a correct substitution into Simpson's rule	**2**

30 (b)(ii) 2 marks
Content: MM4
Outcomes Assessed:MG2H-5
Targeted Performance Bands: 5 - 6

Solution	Criteria	Marks
COST: $= \$59{\cdot}95\times(3{\cdot}3 + 3{\cdot}65)$ $= \$416{\cdot}65$	**2 marks** for the correct answer **1 mark** for finding lengths of two rectangles and multiplying by the cost	**2**

30 (b)(iii) 2 marks
Content:MM4
Outcomes Assessed:MG2H-5
Targeted Performance Bands: 5 - 6

Solution	Criteria	Marks
Top rectangle: length 3·30m breadth 1·85m Area: $6 \cdot 105 m^2$ Bottom rectangle: length 3·65m breadth 1·85m Area: $6 \cdot 7525 m^2$ Area of flooring – Area of Playground $12 \cdot 8575 - 10 \cdot 39 = 2 \cdot 4675$ square metres $\text{percentage} = \frac{2 \cdot 4675}{12 \cdot 8575} \times 100\%$ $= 19 \cdot 19 \ldots \%$ The director will go ahead with the synthetic grass flooring.	**2 marks** for the correct answer **1 mark** for progress towards the answer	**2**

30 (c) (i) (2 marks)
Content: FM4
Outcomes assessed: MG2H-6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
21 Jan to 15 Feb (inclusive) – 26 days $\text{Interest} = 1350 \times \frac{13 \cdot 49}{100} \div 365 \times 26$ $= 12 \cdot 9725753 \ldots$ Michael will pay \$12·97 in interest.	**2 marks** for correct solution. **1 mark** significant progress towards the correct solution which includes **either** division of the interest rate by 365 or correct number of days.	**2**

30 (c) (ii) (1 mark)
Content: FM4
Outcomes assessed:MG2H-6
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
2% of \$1 350 = \$27·00 or 2% of \$1 362·97= \$27·26 The minimum payment will be \$27·00 (or \$27·26)	**1 mark** for correct answer Allow for the inclusion of interest in their calculation of 2%. **NB** accept as correct for previous answer.	**1**

30 (d) 3 marks
Content: MM6
Outcomes Assessed: MG2H-4
Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$\frac{\theta}{360} \times 2\pi \times 6400 = 7930$ $\theta = 71^0$ $A + 48^0 = 71^0$ $A = 23^0$ $\therefore$ the co-ordinates of Windhoek are $(23^0 S, 17^0 E)$	**3 marks** for correct solution **2 marks** for correct angular distance and correct value for latitude, without stating or with incorrect longitude. or **2 marks** for correct calculations with latitude and longitude transposed. **1 mark** for correct use of the arc length result to find the angular distance between the two places.	**3**