

Student number:



Ascham School

**General Mathematics
Trial HSC Examination
July 2012**

General Instructions

- Reading time – 5 minutes.
- Working time – 2 ½ hours.
- Write using blue or black pen.
- Calculators may be used.
- A **Formulae sheet** is provided with this paper.
- A **Multiple Choice** answer sheet is provided with this paper.

Total marks - 100

**Section I
22 Marks**

- Attempt Questions 1-22
- Allow about 30 minutes for this section.
- Give your answers on the **Multiple choice** answer sheet provided.

**Section II
78 Marks**

- Attempt Questions 23 - 28
- Allow about 2 hours for this section.
- Use a separate writing booklet for each question.

Section I

22 marks

Attempt Questions 1-22

Allow about 30 minutes for this section

SECTION I

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

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

A ☐ B ☒ C ☐ D ☐

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

A ☒ B ☒ C ☐ D ☐

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

A ☒ B ☒ ^{correct} C ☐ D ☐

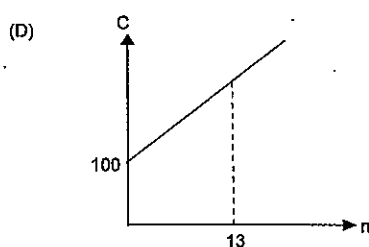
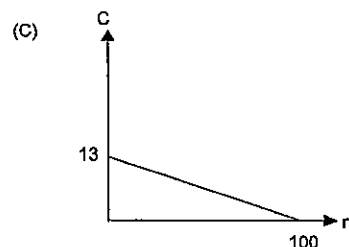
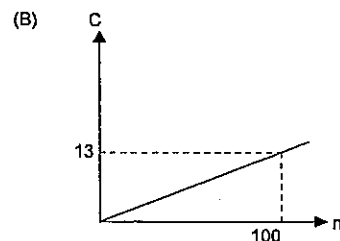
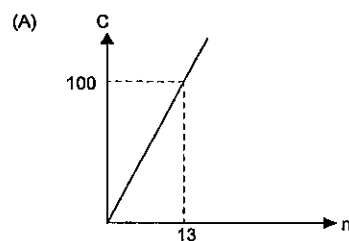
Use the multiple choice answer sheet for questions 1 – 22

- 1 In decimal form, which one is closest to the scientific notation 8.745×10^{-3} ?
(A) 0.875 (B) 0.01 (C) 0.0087 (D) 8 745
- 2 A data set has $Q_1 = 5$ and $Q_3 = 14$.
Which of the following statements is incorrect?
(A) The median must be 9.5.
(B) The interquartile range is 9.
(C) The number 17 could be in the fourth quartile.
(D) The lowest score could be 1.

- 3 A plane leaves London airport and flies 200 nautical miles on a bearing of 135° . The plane's distance *east of the airport*, to the nearest nautical mile (M), is

(A) 200 M (B) 141 M (C) 100 M (D) 135 M

- 4 The cost (\$C) of catering for an afternoon tea for over 13 guests at the "Victoria and Albert Hotel", is directly proportional to the number of guests attending (n). There is an initial set up fee of \$100. Which of the graphs below best represents this information?



- 5 The surface area of a sphere is given by the formula $S = 4\pi r^2$, where r is the radius of the sphere. If the diameter of a sphere is 16cm, then the surface area (to the nearest cm^2) of this sphere is:

(A) 201 cm^2 (B) 402 cm^2 (C) 804 cm^2 (D) 3217 cm^2

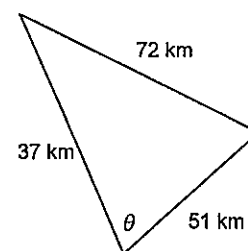
- 6 Two points on the surface of the Earth are $P(45^\circ\text{N}, 35^\circ\text{W})$ and $Q(15^\circ\text{S}, 25^\circ\text{E})$. Which of the following statements about the time difference between P and Q is true?

(A) P is 4 hours ahead of Q
(B) P is 4 hours behind Q
(C) P is 60 minutes ahead of Q
(D) The time difference cannot be determined.

- 7 There are 9 green and 7 white marbles in a bag. Two marbles were drawn out without replacement. Both were found to be green. What is the probability that the next marble drawn will also be green?

(A) $\frac{9}{16}$ (B) $\frac{8}{15}$ (C) $\frac{7}{14}$ (D) $\frac{7}{16}$

- 8 The size of the angle marked θ is closest to



NOT TO SCALE

(A) 36° (B) 44° (C) 81° (D) 109°

- 9 The plot below represents the results from 2 PE classes, 7GL6 and 7GL5. What is the difference in their *median* scores?

7GL6						7GL5					
			8	7	0	9					
9	7	6	4	3	1	1	3	5	7	8	
	8	7	5	1	2	1	4	6	6	7	9
	7	4	3	1	3	1	1	2			

(A) 6 (B) 4 (C) 3 (D) 1

- 10 The depreciated value of a sports car is \$14 000.
If the car was depreciated, by the declining balance method, at a rate of 15% pa for 6 years, then the original value of the sports car (to the nearest \$1000) was:

(A) \$71 000 (B) \$40 000 (C) \$37 000 (D) \$20 000

- 11 Ellie made two errors in her solution to the following equation:

$$7(x+1) - 3(x+2) = 24$$

$$7x+7 - 3x+6 = 24 \quad \text{Line 1}$$

$$4x+13 = 24 \quad \text{Line 2}$$

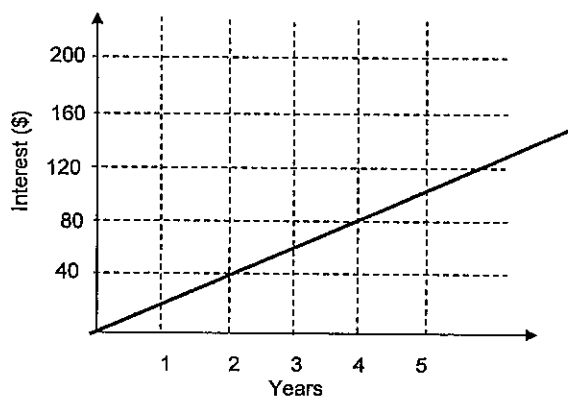
$$4x = 37 \quad \text{Line 3}$$

$$x = \frac{37}{4} \quad \text{Line 4}$$

Which two lines follow correctly from the previous line?

- (A) Line 1 and Line 2
(B) Line 1 and Line 3
(C) Line 2 and Line 3
(D) Line 2 and Line 4

- 12 If \$1000 is invested in an account, the interest paid is as indicated by the graph below.



The annual flat rate of interest is

- (A) 20% (B) 10% (C) 5% (D) 2%

- 13 Bombay is +5 hours on GMT and Hollywood is -8 hours on GMT.
A Bollywood Movie Director in Bombay wants to phone a movie star in Hollywood. What time is it in Hollywood if it is 10:30am on Monday in Bombay?

- (A) Monday 11:30pm (B) Sunday 11:30 pm
(C) Monday 9:30 pm (D) Sunday 9:30 pm

- 14 What is $\sqrt{\frac{a^2+b}{8b}}$, if $a = 26$ and $b = 3.4$ correct to 2 decimal places?

- (A) 46.99 (B) 47.00 (C) 4.99 (D) 5.00

- 15 The table below shows the monthly repayments per \$1000 on a bank home loan. Pippa decides to take out a loan for \$270 000 to buy an apartment.

Term of Loan (years)	6.00%	6.25%	6.50%	6.75%	7.00%	7.25%	7.50%
5	\$19.33	\$19.45	\$19.57	\$19.68	\$19.80	\$19.92	\$20.04
10	\$11.10	\$11.23	\$11.35	\$11.48	\$11.61	\$11.74	\$11.87
15	\$8.44	\$8.57	\$8.71	\$8.85	\$8.99	\$9.13	\$9.27
20	\$7.16	\$7.31	\$7.46	\$7.60	\$7.75	\$7.90	\$8.06
25	\$6.44	\$6.60	\$6.75	\$6.91	\$7.07	\$7.23	\$7.39

Determine the monthly repayment for a loan of \$270 000 at 6.25% p.a. interest rate over 15 years.

- (A) \$8.57 (B) \$857 (C) \$2314 (D) \$ 3241

- 16 The solution to $\frac{2x+1}{3} = \frac{4x-7}{5}$ is

- (A) $x=7$ (B) $x=9$ (C) $x=11$ (D) $x=13$

- 17 Miss Williams decided to survey a sample of 10% of the total students at Ascham.
The school enrolment is shown in the table below:

Year	7	8	9	10	11	12	Total
Number Of Students	94	83	107	82	89	85	540

She surveyed the same number of students in each year group.

How would the numbers of students in Year 9 and Year 10 have changed if Mrs Potter had chosen to use *stratified* sample based on year groups?

- (A) Increased in both Year 9 and Year 10
(B) Decreased in both Year 9 and Year 10
(C) Increased in Year 9 and decreased in Year 10
(D) Decreased in Year 9 and increased in Year 10
- 18 A ship travelling with supplies for the Norwegian Arctic base is 240M (nautical miles) due north of Oslo. If Oslo is located at 60° N , 11° E , the latitude and longitude of the ship is

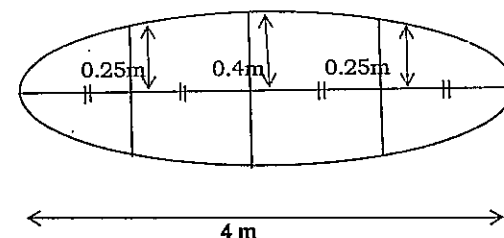
60° N, 15° E (B) 64° N, 11° E (C) 56° N, 11° E (D) 56° N, 15° E

- 19 Rebecca wanted to save for a holiday to South America. She invested \$500 each month into an account for 2 years earning 9% pa, compounding quarterly (every three months).

Which is the correct equation for this investment strategy?

- (A) $A = \frac{500(1.09^2 - 1)}{0.09}$ (C) $A = \frac{1500(1.09^8 - 1)}{0.09}$
(C) $A = \frac{500(1.0225^2 - 1)}{0.0225}$ (D) $A = \frac{1500(1.0225^8 - 1)}{0.0225}$

- 20 The uppermost face of a surf board is drawn below.



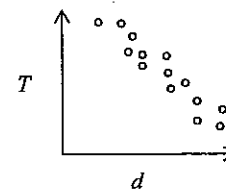
The area of this face of the surf board can be found using 2 applications of Simpson's Rule by which expression below?

- (A) $\left[\frac{1}{3}(0 + 4 \times 0.25 + 0.4) + \frac{1}{3}(0.4 + 4 \times 0.25 + 0) \right] \times 2$
(B) $\left[\frac{4}{3}(0 + 4 \times 0.25 + 0.4) + \frac{4}{3}(0.4 + 4 \times 0.25 + 0) \right] \times 2$
(C) $\left[\frac{1}{3}(0 + 4 \times 0.4 + 0) \right] \times 2$
(D) $\left[\frac{4}{3}(0.25 + 4 \times 0.4 + 0.25) \right] \times 2$

- 21 From a carton of twelve eggs, a random sample of three is chosen. If the order of selection is not important, then the number of different samples is:

- (A) $\frac{12 \times 11 \times 10}{3 \times 2 \times 1}$ (B) $12 \times 11 \times 10$ (C) $\frac{12 \times 12 \times 12}{3 \times 2 \times 1}$ (D) $3 \times 2 \times 1$

- 22 The temperature (T) is measured at various distances from the equator (d), where d is measured in 1000's km, as shown in the scatterplot below:



The equation of the line of best fit for this relationship could be

- (A) $T = 3d + 24$ (B) $T = 24 - 3d$ (C) $T = 2d^2 - 24$ (D) $T = -3d^2 + 24$

END of SECTION I

Section II
78 marks

Attempt questions 23-28

Allow about 2 hours for this section

Answer each question in a separate booklet.

Extra booklets are available.

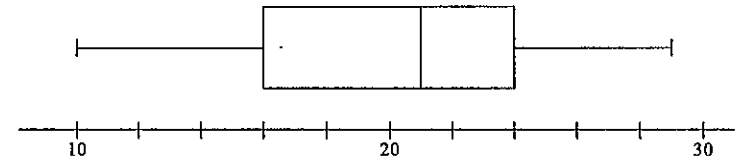
All necessary working must be shown.

Question 23 (13 marks) Start and label a new answer booklet.

- | | | Marks |
|------|---|--------------|
| (a) | Simplify each of the following expressions. | |
| (i) | $2 + 4(5a + 7b) - 19a$ | 2 |
| (ii) | $\frac{16a^5}{10a^3}$ | 2 |
| (b) | (i) Using the equation $X = YZ^2$ find the value X if $Y = 12$ and $Z = -4$ | 1 |
| | (ii) Rearrange the equation $X = YZ^2$ to make Z the subject of the formula . | 2 |
| | (iii) Find the value(s) of Z if $X = 128$ and $Y = 2$. | 1 |
| (c) | Camilla and Jessica plan an overseas holiday to Canada. They have saved \$AU 4500 for spending money. The table converts various currency rates.
For example, \$1 CAN = £0.444 UK
Using the table, how many Canadian dollars could they get with their money? | 2 |

Currency Conversion:	\$US	\$AU	£UK	\$CAN
\$US	1	0.4974	1.44	0.6397
\$AU	2.01	1	2.894	1.286
£UK	0.6946	0.3455	1	0.444
\$CAN	1.563	0.7776	2.25	1

- (d) The box-and-whisker plot shows the age distribution, in years, of the members of a Hip Hop Dance Club.



- | | | |
|-------|---|----------|
| (i) | Write down the median age of the Dance Club. | 1 |
| (ii) | Find the interquartile range of the ages of the Dance Club members. | 1 |
| (iii) | What percentage of Hip Hop Club members fall between 24 and 29 years old? | 1 |

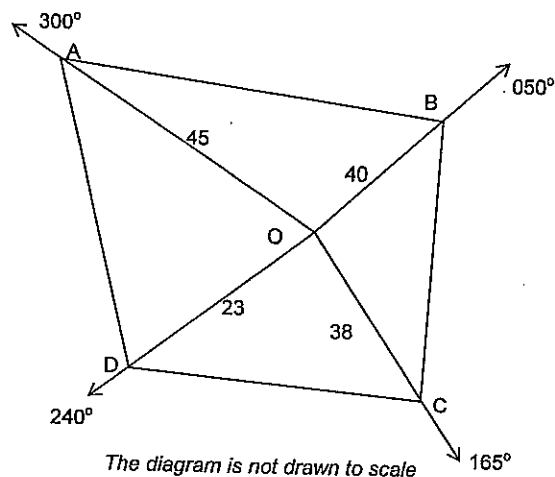
Question 24 (13 marks) Start and label a new answer booklet

- (a) A test has been developed to detect whether an individual carries the whooping cough virus. Four hundred (400) people were tested and the results were recorded in a two-way table. Marks

		Test results	
		Positive	Negative
Carrier		145	27
Non Carrier		35	A
			400

- (i) What is the value of A? 1
- (ii) A person selected from the group is a carrier of the virus. What is the probability that the test results show this? 1
- (iii) For how many of the people tested were the results inaccurate? 1

- (b) The radial survey of the Fiona playground is drawn below. All distances are in metres.



- (i) What is the size of angle DOC? 1
- (ii) Calculate the area of the section of the playground labelled DOC correct to one decimal place. 2
- (iii) Calculate the length of DC correct to one decimal place. 2

- (c) A golfer hits a golf ball down the fairway. Its flight is described by $H = 4d - \frac{d^2}{25}$ where H is the height of the ball and d is the distance travelled, down the fairway, in metres.

- (i) Would the graph of this function be concave up or concave down? 1

- (ii) Copy and complete this table of values into your answer booklet.

d	0	20	40	60	80	100	120
H							

- (iii) Sketch the function onto your answer booklet, using the values from your table above. Label the d and H axes clearly. 2
- (iv) What is the greatest height reached by the golf ball? 1

Question 25 (13 marks) Start and label a new answer booklet

Marks

- (a) Georgina invests \$6 000 in a fixed term deposit for 8 years at 7% pa compounding half-yearly.

(i) How much money will be in her account at the end of 8 years? **2**

(ii) What is the interest earned? **1**

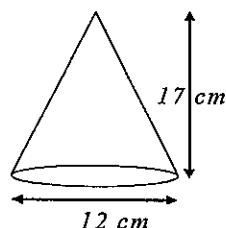
- (b) The table below is the weekly time sheet for the employees at an Edgecliff Café.

Employee	Normal Rate	Normal Hours	Time-and-a-Half	Double Time	Gross Weekly Wage
Lavinia	\$19.90	36	-	-	\$716.40
Gabby	\$22.50	30	4	2	A
Laura	B	32	0	1	\$714.00

(i) Calculate Gabby's gross weekly wage (A). **2**

(ii) Using Laura's gross weekly wage from the table, calculate her normal hourly rate (B). **2**

- (c) (i) Find the volume of the ice cream cone drawn. Give your answer in cm^3 to 3 significant figures. **3**



The diagram is not drawn to scale

(ii) Find the volume of TWO HUNDRED and FIFTY (250) cones. Convert your answer to m^3 . **2**

(iii) How many litres of ice cream can TWO HUNDRED and FIFTY (250) cones hold when full? **1**

Question 26 (13 marks) Start and label a new answer booklet

Marks

- (a) Lily has to choose an outfit that she can wear to the Year 12 Formal. She can choose to make an outfit from four blouses (B1, B2, B3, B4), three skirts (S1, S2, S3) and two pairs of Lamboutini shoes (L1, L2) in her wardrobe.

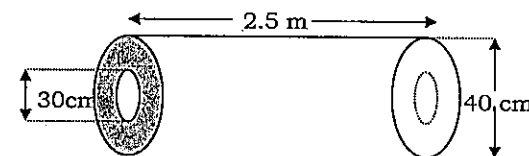
(i) How many different combinations of outfits could Lily wear to the Year 12 Formal? **1**

(ii) Write out five different combinations possible. You should use the abbreviation suggested above for blouses (B1, B2, B3, B4), skirts (S1, S2, S3) and Shoes (L1, L2). **1**

- (b) An activity tunnel was constructed in concrete for the meerkats at Taronga Zoo.



The inner diameter is 30 cm and the outer diameter is 40 cm. The tunnel is 2.5 metres long.



(i) Find the **shaded** cross-sectional area of the concrete tunnel. Give your answer to the nearest cm^2 . **2**

(ii) Find the volume of concrete required to make a tunnel of length 2.5 metres. Write your answer in m^3 . **2**

(iii) Only the outer curved surface area of the tunnel needs to be painted in Jungle Green. How many square metres of tunnel needs to be painted in Jungle Green? Give your answer correct to the nearest m^2 . **2**

- (c) Hannah takes out a home loan of \$250 000 at 9% p.a. reducible interest. Interest (I) is calculated monthly. She will make a repayment (R) of \$3000 each month. Hannah draws up a table showing the progress she makes in repaying the loan over the first 4 months.

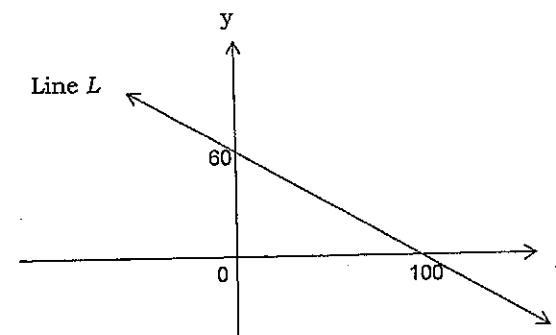
MONTHS	Principal (P)	Interest (I)	P + I	P + I - R
1	250 000.00	1875.00	251 875.00	248 875.00
2	248 875.00	1866.56	250 741.56	247 741.56
3	247 741.56	1858.06	249 599.62	246 599.62
4	246 599.62	1849.50	248 449.12	245 449.12
5	A	B		C

- (i) Show that the monthly interest rate as a decimal is 0.0075 1
- (ii) Calculate the values of A, B and C. 2
- (iii) By how much had Hannah reduced the principal of the loan at the end of 4th month? 2

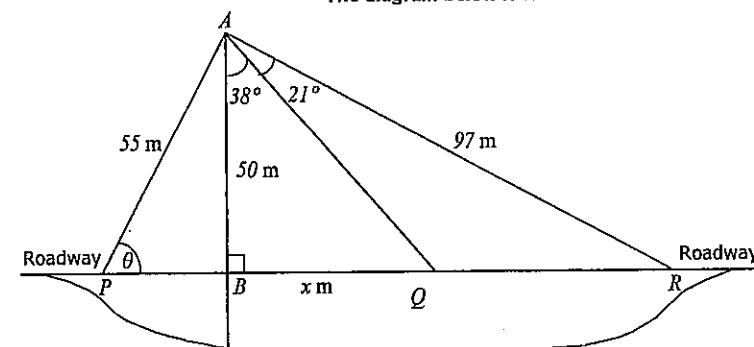
Question 27 (13 marks) Start and label a new answer booklet

Marks

- (a) The line L is drawn on the number plane below. Determine the equation of the line L 2



- (b) The diagram below is not drawn to scale



The diagram shows the vertical pylon (AB) of a bridge. The top of the pylon, A, is 50 metres above B on the roadway.

AP, AQ and AR are supporting cables.

AB = 50 m, AP = 55 m, AR = 97 m, $\angle BAP = 38^\circ$ and $\angle QAR = 21^\circ$.

Let $\angle APB = \theta$, BQ = x metres.

- (i) Using trigonometry, calculate the angle θ marked in the diagram. Give your answer to the nearest degree. 2
- (ii) Use trigonometry to calculate the length of BQ, to the nearest metre. 2
- (iii) Find the distance between points Q and R, to the nearest metre. 2

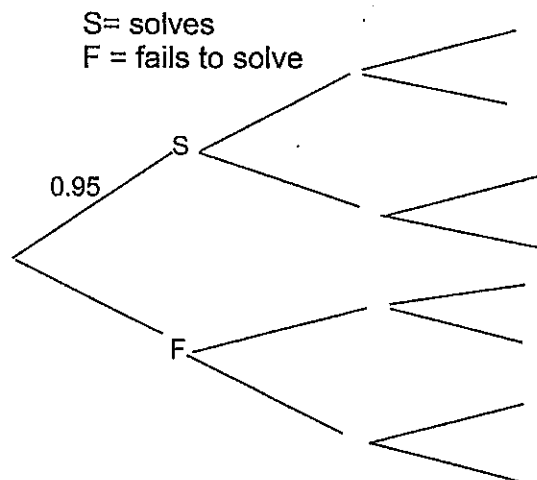
- (c) The probability that Mrs Potter can solve the SMH daily crossword puzzle of various levels of difficulty is given in the table.

Easy Crossword	0.95
Moderate Crossword	0.65
Hard Crossword	0.25

- (i) What is the probability that she fails to solve a moderate puzzle? 1

In the holidays Mrs Potter does three crossword puzzles each week, one easy, one moderate and one hard.

- (ii) Copy and complete the **probability tree diagram** below into your answer booklet. 2



- (ii) What is the probability that Mrs Potter solves **none** of the three puzzles? 1
- (iii) What is the probability that she solves at least one puzzle? 1

Question 28 (13 marks) Start and label a new answer booklet

Marks

- (a) (i) The Whitehead Rowing Club wishes to accumulate \$300 000 in 5 years' time to refurbish the clubhouse. The Club invests each month into a fund paying 8% pa interest compounding monthly. Calculate the amount the Club must deposit each month to reach their target of \$300 000 after 5 years. Give your answer to the nearest \$1. 3

- (b) One qualifying match of the 2012 Euro Football Competition was played between Germany and Greece. The following table gives the ages for each player in the match.



GERMANY	GREECE
28 21 24 30 22 31 23 25 27 33 28 21 27 31 26 27 23 28 26 23	23 26 27 27 24 27 24 27 26 32 19 30 25 27 25 27 21 32 26 23
$Q_0 = 21, Q_1 = 23, Q_2 = 26.5, Q_3 = 28, Q_4 = 33$ $\bar{X} = 26.2, \sigma_x = 3.37$	

The five-figure summary, mean and standard deviation are given for Germany.

- (i) Write down the five-figure summary (Q_0, Q_1, Q_2, Q_3, Q_4) for the ages of the Greek Team. 2
- (ii) Write down the mean and standard deviation of ages for the Greek team. 2
- (iii) Use the information from (i) and (ii) above, to discuss the differences and/or similarities in the ages of the German and Greek Football Teams. You should mention the statistical terms you have found. 2

- (c) Miss Williams flies from Sydney to London leaving at 20:45 on Friday 22nd June. The journey takes 22 hours 40 mins.
- (i) What is the local time when she arrives in London?
[London is on GMT, Sydney is +10 on GMT] 2
- (ii) The distance from Sydney to London is 17 000 km. What is the average speed of Miss William's plane correct to 2 significant figures? 2

THE END

Solution to General Trial 2012 Ascham.

Multiple Choice

Working

1. Calculator

$$0.008745$$

$$0.0087$$

C

2. $Q_1 = 5$, $Q_3 = 14$

A x

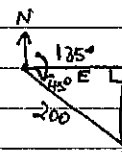
B ✓

C ✓

D ✓

A

3.



$$\cos 45^\circ = \frac{E}{200}$$

$$200 \cos 45^\circ = E$$

$$E = 141.421 \dots$$

$$E = 141 \text{ M}$$

B

4.

D

5.

$$S = 4\pi r^2$$

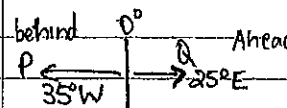
$$= 4 \times \pi \times 8^2$$

$$= 804.2477 \dots$$

$$\approx 804 \text{ cm}^2$$

C

6.



(ignore latitude)

angle between = 60°

$$(1^\circ = 4')$$

$$15^\circ = 1 \text{ hour}$$

$$\therefore 60^\circ = 4 \text{ hours}$$

B

7 Two drawn and removed

$\therefore$ 14 left in bag.

Now 7 green, 7 white

$$P(G) = \frac{7}{14}$$

C

$$8 \quad \cos \theta = \frac{37^2 + 51^2 - 72^2}{2 \times 37 \times 51}$$

$$\theta = 108.76 \dots$$

$$\theta = 109^\circ$$

D

9. 7GL6 median = 21

7GL5 median = 24

$$24 - 21 = 3$$

C

$$10 \quad 14,000 = V_0(1 - 0.15)^6$$

$$14,000 = V_0$$

$$0.85^6$$

$$V_0 = \$37120.56$$

$$\approx \$37,000$$

C

11 Line 1 x

Line 2 v

Line 3 x

Line 4 v

D

12 when $n=2$, $I = \$40$

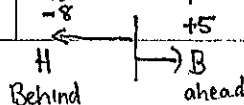
$$\left(\frac{40}{1000} \times 100\% \right) \div 2 = 2\%$$

D

13. 13 hours apart. 24 - (8+5)

$$= 11$$

= 11 hrs behind in Hollywood



D

$$14 \quad \sqrt{\frac{26^2 + 3.4}{8 \times 3.4}}$$

$$4.9977 \dots$$

$$\approx 5.00 \text{ (2dp)}$$

D

$$15 \quad 270 \times 8.57$$

$$= \$2313.90$$

$$\approx \$2314$$

C

$$16 \quad \frac{2x+1}{3} = \frac{4x-7}{5}$$

$$105(2x+1) = 3(4x-7)$$

$$10x+5 = 12x-21$$

$$26 = 2x$$

$$x = 13$$

D

Year	9	10	
Same Surveyed	9	9	$540 \div 6 = 90$
Stratified	$\frac{107}{540} \times 54$	$\frac{82}{540} \times 94$	$10\% \times 90 = 9$
	10.7	8.2	
	≈ 11	≈ 8	
	increase decrease		

C

$$18 \quad 240M = 4^\circ$$

Base is due North 4°

$$\text{FACT } (60M = 1^\circ)$$

$\therefore$ Base $(64^\circ N, 11^\circ E)$

B

19. Every 3 months / quarterly

$\therefore$ investing \$1500 (500×3)

$$2 \text{ years} = 2 \times 4 = 8 \text{ time periods}$$

$$\text{Interest} = 0.09 \div 4 = 0.0225$$

D

20. 2 Applications
 $\therefore$ one of (A) or (B)
 ✓ X

A

21. Order not important
 ${}_{12}C_3 = \frac{12 \times 11 \times 10}{3 \times 2 \times 1}$

A

22. Line of Best Fit
 Decreasing $\therefore$ choose B

B

Name/Student Number.....

GENERAL MATHEMATICS TRIAL 2012

MULTIPLE-CHOICE ANSWER SHEET

1. A ☐ B ☐ C ☒ D ☐
2. A ☒ B ☐ C ☐ D ☐
3. A ☐ B ☒ C ☐ D ☐
4. A ☐ B ☐ C ☐ D ☒
5. A ☐ B ☐ C ☒ D ☐
6. A ☐ B ☒ C ☐ D ☐
7. A ☐ B ☐ C ☒ D ☐
8. A ☐ B ☐ C ☐ D ☒
9. A ☐ B ☐ C ☒ D ☐
10. A ☐ B ☐ C ☒ D ☐
11. A ☐ B ☐ C ☐ D ☒
12. A ☐ B ☐ C ☐ D ☒
13. A ☐ B ☐ C ☐ D ☒
14. A ☐ B ☐ C ☐ D ☒
15. A ☐ B ☐ C ☒ D ☐
16. A ☐ B ☐ C ☐ D ☒
17. A ☐ B ☐ C ☒ D ☐
18. A ☐ B ☒ C ☐ D ☐
19. A ☐ B ☐ C ☐ D ☒
20. A ☒ B ☐ C ☐ D ☐
21. A ☒ B ☐ C ☐ D ☐
22. A ☐ B ☒ C ☐ D ☐

Section II

Q23

(a) (i) $2 + 4(5a + 7b) - 19a$
 $= 2 + 20a + 28b - 19a$
 $= 2 + a + 28b$ [2]

[4]

(ii) $\frac{16a^5}{10a^3} = \frac{8a^2}{5}$ [2]

(b) (i) $X = YZ^2$
 $= 12 \times (-4)^2$
 $= 12 \times 16$
 $= 192$ [1]

(ii) $X = YZ^2$
 $X = Z^2$
 $\sqrt{X} = Z$

$Z = \pm \sqrt{\frac{X}{Y}}$ [2]

(iii) $Z = \pm \sqrt{\frac{128}{2}}$
 $Z = \pm \sqrt{64}$
 $Z = \pm 8$ [1]

(c) Aus \$4500 $\rightarrow$ Canadian \$
 4500×0.7776
 $= \$3499.20$ [2]

(d) (i) Median age = 21 years [1]

(ii) Interquartile range = $24 - 16$
 $= 8$ years [1]

(iii) one quartile = 25% [1]

Q24

(i)

	+	-	
Carrier	145	27	172
Non-carrier	35	A	← 228
	180		400

↑
220

$\therefore A = 220 - 27$ or $A = 228 - 35$

$A = 193$ [1]

[3]

(ii) $P(\text{Carrier}) = \frac{145}{172} \times 100\%$
 $= 84\%$ [1]

(iii) Inaccurate for = $27 + 35$
 $= 62$ people [1]

(b) (i) $\angle DOC = 240^\circ - 165^\circ$
 $= 75^\circ$ [1]

(ii) Area $\triangle DOC = \frac{1}{2}ab \sin C$
 $= \frac{1}{2} \times 23 \times 38 \times \sin 75^\circ$
 $= 422.109...$
 $= 422.1 \text{ m}^2$ (1dp) [2]

(iii) let $DC = c$

$c^2 = a^2 + b^2 - 2ab \cos C$

$c^2 = 23^2 + 38^2 - 2 \times 23 \times 38 \times \cos 75^\circ$

$c^2 = 1520.58...$

$c = 38.99...$

$c = 39.0 \text{ m}$ (1dp) [2]

[5]

(c) (i) $H = 4d - \frac{d^2}{25}$

as coefficient of d^2 is negative

$\therefore$ concave down

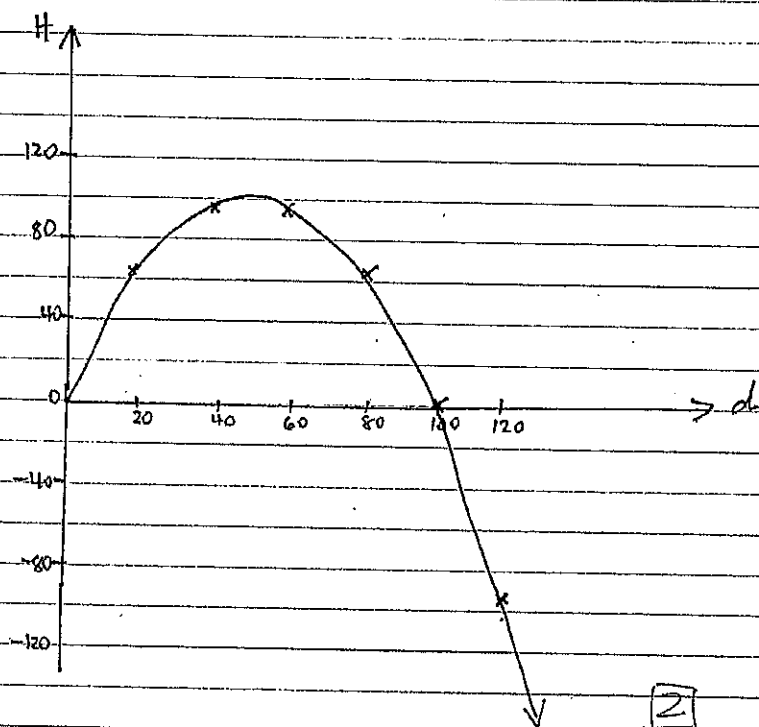
[1]

(ii)

d	0	20	40	60	80	100	120
H	0	64	96	96	64	0	-96

[1]

(iii)



[5]

(ii) greatest height reached when $x = 50$

$$H = 4 \times 50 - \frac{50^2}{25}$$

$$H = 100 \text{ metres}$$

[1]

Q25 a) (i)

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

$$= 6000(1 + \frac{0.07}{2})^{8 \times 2}$$

$$= 6000(1.035)^{16}$$

$$= \$10,403.916...$$

$$= \$10,403.92 \text{ (nearest cent)}$$

[2]

[3]

(ii) Interest earned = $A - P$

$$= 10,403.92 - 6000$$

$$= \$4,403.92$$

[1]

b) (i) Gabby's Gross weekly wage

$$= \$22.50(30 + 4 \times 1\frac{1}{2} + 2 \times 2)$$

$$= \$22.50(30 + 6 + 4)$$

$$= \$22.50 \times 40$$

$$= \$900$$

[2]

(ii) Laura's gross pay = \$714

Number of hours worked = 32 normal + 1 double
= 34 normal hours

[4]

$$\text{Laura's hourly rate} = \frac{\$714}{34}$$

$$= \$21$$

[2]

$$(i) V_{\text{cone}} = \frac{1}{3} \pi r^2 h$$

$$= \frac{1}{3} \times \pi \times 6^2 \times 17$$

$$= 640.8849 \dots$$

$$V \approx 641 \text{ cm}^3 \text{ (3sf)}$$

[3]

$$(ii) V_{250 \text{ cones}} = 250 \times 641$$

$$= 160,250 \text{ cm}^3$$

$$(\div 100^3) = 0.160250 \text{ m}^3$$

[2]

$$(iii) 1 \text{ cm}^3 = 1 \text{ ml}$$

$$1000 \text{ cm}^3 = 1 \text{ litre}$$

$$1 \text{ m}^3 = 1000 \text{ litres}$$

} units conversion

$$\text{Capacity of ice cream} = \frac{160250 \text{ cm}^3}{1000}$$

$$= 160.25 \text{ litres}$$

[1]

$$(i) \text{ Number of different outfits} = 4 \times 3 \times 2$$

$$= 24$$

[1]

(ii) Any 'five' of the 24

B1 S1 L1

B2 S1 L1

B3 S1 L1

B4 S1 L1

B1 S2 L1

B2 S2 L1

B3 S2 L1

B4 S2 L1

B1 S1 L2

B2 S3 L1

B3 S3 L1

B4 S3 L1

B1 S2 L2

B2 S1 L2

B3 S1 L2

B4 S1 L2

B1 S3 L1

B2 S2 L2

B3 S2 L2

B4 S2 L2

B1 S3 L2

B2 S2 L3

B3 S3 L3

B4 S3 L2

[1]

$$(b) \text{ Cross-sectional area} = \pi R^2 - \pi r^2$$

$$= \pi \times 20^2 - \pi \times 15^2$$

$$= 549.778$$

$$= 550 \text{ cm}^2$$

[2]

$$(ii) \text{ Volume of concrete} = \text{Area} \times \text{length}$$

$$= \frac{550}{100^2} \times 2.5$$

$$= 0.1375 \text{ m}^3$$

[2]

$$(iii) \text{ Curved surface area} = 2\pi rh \quad (r=40\text{cm})$$

$$= 2 \times \pi \times 0.2 \times 2.5$$

$$= 3.141 \dots$$

$$= 3 \text{ m}^2 \text{ (nearest m}^2)$$

[2]

$$(c) \text{ Monthly interest rate} = \frac{9}{100} \div 12$$

$$= 0.0075$$

[1]

$$(ii) A = \$245\,449.12 \quad B = A \times 0.0075$$

$$C = P + I - R$$

$$= \$1840.87 \text{ (nearest cent)}$$

$$= A + B - 3000$$

$$= \$244\,289.99$$

$$(iii) \text{ Reduction} = \$250\,000 - \$245\,449.12$$

$$= \$4\,550.88$$

[2]

Q27(a) $y = mx + b$

When $x=0$, $y=60 \therefore b=60$

$\therefore y = mx + 60$

When $x=100$, $y=0$,

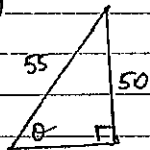
$0 = 100m + 60$

$\frac{-60}{100} = m$

$m = -\frac{3}{5}$

$\therefore y = -\frac{3}{5}x + 60$

(b) (i)



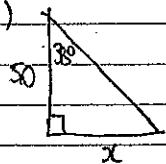
$\sin \theta = \frac{50}{55}$

$\theta = \sin^{-1}\left(\frac{50}{55}\right)$

$\theta = 65.38\dots$

$\theta = 65^\circ$ (nearest degree)

(ii)



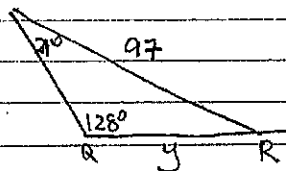
$\tan 38^\circ = \frac{x}{50}$

$50 \tan 38^\circ = x$

$x = 39.06\dots$

$x = 39$ metres

(iii) $\angle AQB = 52^\circ$ (angle sum of Δ)
 $\therefore \angle AQR = 128^\circ$ (straight $\angle$)



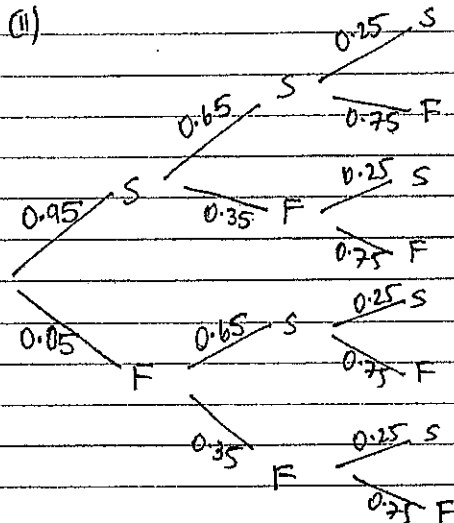
$\frac{y}{\sin 21^\circ} = \frac{97}{\sin 128^\circ}$

$y = \frac{97 \times \sin 21^\circ}{\sin 128^\circ}$

$y = 44.113\dots$
 $\therefore 44$ metres

(i) $P(\text{fails to solve}) = 1 - 0.65 = 0.35$

Q27 (c) (ii)



(iii) $P(\text{does not solve 3 puzzles}) = P(FFF)$
 $= 0.05 \times 0.35 \times 0.75$
 $= 0.013125$

(iv) $P(\text{solves at least one puzzle}) = 1 - P(FFF)$
 $= 1 - 0.013125$
 $= 0.986875$

28(a) $A = M \left\{ \frac{(1+r)^n - 1}{r} \right\}$

$r = \frac{0.08}{12}$

$300000 = M \left\{ \frac{(1 + \frac{0.08}{12})^{5 \times 12} - 1}{\frac{0.08}{12}} \right\}$

$n = 5 \times 12$
 $n = 60$

$300,000 = M \times 73.4768 \dots$

$M = \frac{300000}{73.4768 \dots}$

$M = \$4082.918 \dots$

$M = \$4083 \text{ per month.}$

Graphics

$n = 5 \times 12$

$I\% = 8 \div 12$

$PV = 0$

$PMT = ?$

$FV = 300000$

$P/Y = 1$

$C/Y = 1$

$\therefore PMT = 4082.91 \dots$

(b) Greek Team

(i) Five figure summary

$Q_0 = 19$ (min value)

$Q_1 = 24$

$Q_2 = 26$ (median)

$Q_3 = 27$

$Q_4 = 32$

(ii) Greek Team

mean = $\bar{x} = 25.9$ years

standard deviation = $\sigma_2 = 3.13$ years (2dp)

(iii) Both teams have more similarities than differences, but the

The interquartile range for Germany is $28 - 23 = 5$

The interquartile range for Greece is $27 - 24 = 3$

More players in the Greek team are between 24 and 27 years old.

Both means are similar; Germany's $\bar{x} = 26.2$ years and Greece's $\bar{x} = 25.9$ years. Both the standard deviations Germany $\sigma_1 = 3.37$ and Greece $\sigma_2 = 3.13$, means that Germany has a larger spread of ages in their team.

(28) (c) Sydney $\rightarrow$ London on Fri 22nd June.

(i)
$$\begin{array}{r} 20^\circ 45' \\ + 22^\circ 40' \\ \hline 43^\circ 25' \end{array} - (24) = 19^\circ 25'$$

Arrives $\begin{array}{l} 7:25 \text{ pm} \\ \text{Sat} \end{array}$ Sydney Time.

$\therefore$ in London arrives at 9:25 am Saturday (09:25)

(ii) $S = \frac{d}{t}$

$= \frac{17000}{22 \text{ hr } 40 \text{ min}}$

$= 750 \text{ km/h}$ (2 sig fig)

(accept conversion to M (nautical miles))