



**ABBOTSLEIGH**

**2010**

**YEAR 12  
TRIAL HIGHER SCHOOL CERTIFICATE  
EXAMINATION**

# General Mathematics

## 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.

**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.

### **Section II 78 Marks**

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

## Outcomes Assessed

### Preliminary course

- P1** develops a positive attitude to mathematics and appreciates its capacity to provide enjoyment and recreation
- P2** applies mathematical knowledge and skills to solving problems within familiar contexts
- P3** develops rules to represent patterns arising from numerical and other sources
- P4** represents information in symbolic, graphical and tabular forms
- P5** represents the relationships between changing quantities in algebraic and graphical form
- P6** performs calculations in relation to two-dimensional and three-dimensional figures
- P7** determines the degree of accuracy of measurements and calculations
- P8** models financial situations using appropriate tools
- P9** determines an appropriate form of organisation and representation of collected data
- P10** performs simple calculations in relation to the likelihood of familiar events
- P11** justifies his/her response to a given problem using appropriate mathematical terminology

### HSC course

- H1** appreciates the importance of mathematics and its usefulness in contributing to society
- H2** integrates mathematical knowledge and skills from different content areas in exploring new situations
- H3** develops and tests a general mathematical relationship from observed patterns
- H4** analyses representations of data in order to make inferences, predictions and conclusions
- H5** makes predictions about the behaviour of situations based on simple models
- H6** analyses two-dimensional and three-dimensional models to solve practical and mathematical problems
- H7** interprets the results of measurements and calculations and makes judgements about reasonableness
- H8** makes informed decisions about financial situations
- H9** develops and carries out statistical processes to answer questions which she/he and others have posed
- H10** solves problems involving uncertainty using basic principles of probability
- H11** uses mathematical argument and reasoning to evaluate conclusions drawn from other sources, communicating his/her position clearly to others

## SECTION I

22 Marks

Attempt Question 1 – 22

Allow about 30 minutes for this section.

Use the multiple-choice answer sheet.

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

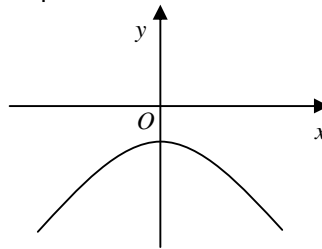
If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

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  C  D

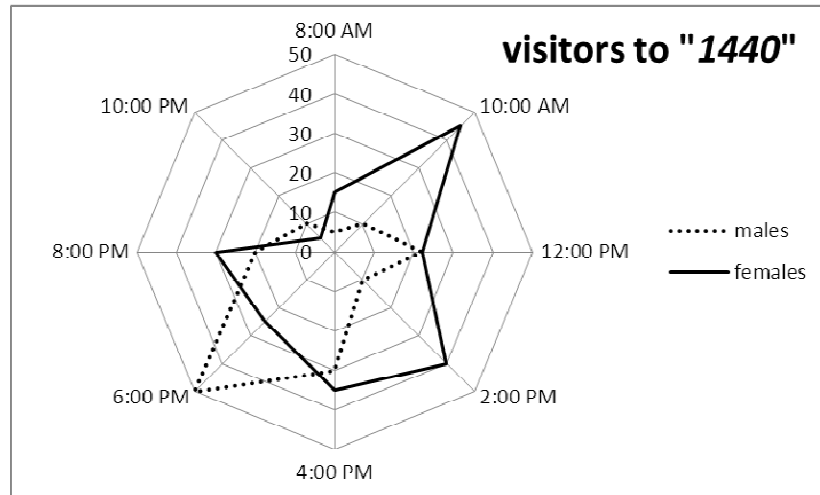
- 
- A toaster manufacturer tests every 20<sup>th</sup> toaster. What type of sampling is this?  
(A) Biased (B) random (C) stratified (D) systematic
  - In seven games of cricket a batsman averages 13 runs per game. In the next two games he scores 21 and 5. His new average will be?  
(A) 5.4 (B) 13 (C) 18 (D) 31
  - The parabola shown could have the equation:



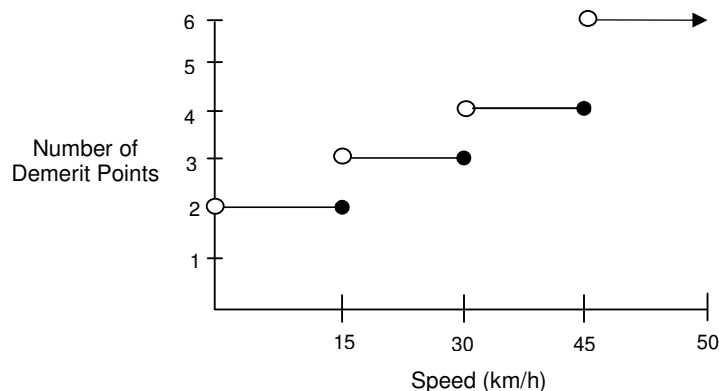
- (A)  $y = x^2 - 3$  (B)  $y = x^2 + 3$  (C)  $y = -x^2 + 3$  (D)  $y = -x^2 - 3$
- To get through to the second round of the Football World Cup, Australia needed to win their game against Serbia and Germany had to beat Ghana by more than 4 goals. Tom gave Australia a 70% chance of winning and he estimated that Germany had a 83% chance of winning by at least 4 goals. Based on Tom's estimations what was the chance that Australia would proceed to the next round?  
(A)  $0.7 \times 0.83$  (B)  $0.7 + 0.83$  (C)  $0.7 \times 0.17$  (D)  $0.7 + 0.17$

5. A study found that there was a strong positive correlation between a basketball player's ability and the length of his shorts. Tom concluded that he would be a good player if he wore longer shorts. This is an example of
- (A) causality                      (B) a normal distribution      (C) positive skew                      (D) negative skew

6. Below is a chart showing the number of males and females visiting the photographic exhibition "1440" at the State Library. Data was collected every 2 hours from the 8am opening until the 10pm closing. The curator analysed the results and made the following comments. Which one of them is *incorrect*?



- (A) At 2pm there were 40 females at the exhibition.
- (B) At 6pm there were 50 males at the exhibition.
- (C) At 12 noon there were more females than males at the exhibition.
- (D) At 6pm there were more males than females at the exhibition.
7. The graph below shows the relationship between the number of demerit points and the amount by which the speed limit is exceeded when a motorist incurs a traffic fine. A police radar recorded Lauren travelling at 95km/h in an 80km/h zone. How many demerit points will she lose?



- (A) 2                      (B) 3                      (C) 4                      (D) 6

8. Ben is saving for a trip to Central Australia. He works at the Exotic Pet Store for 10 hours one Sunday. The Sunday rate of pay is \$15.80 for the first 4 hours then time and a half for additional hours worked. How much would Ben earn on this Sunday?

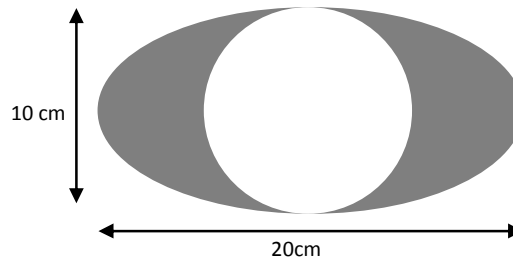
(A) \$142.20                      (B) \$158.00                      (C) \$205.40                      (D) \$237.00

9. Given that  $v^2 = u^2 + 2as$ , then the value of  $v$  when  $u = 3.2 \times 10^4$ ,  $a = 9.8$  and  $s = 1.9 \times 10^7$  is:

(A)  $1.9 \times 10^4$                       (B)  $3.7 \times 10^4$                       (C)  $3.7 \times 10^8$                       (D)  $1.4 \times 10^9$

10. The area of the shaded region is closest to:

*Not drawn to scale*



(A)  $79 \text{ cm}^2$                       (B)  $157 \text{ cm}^2$                       (C)  $314 \text{ cm}^2$                       (D)  $550 \text{ cm}^2$

11. Kriste solved the following equation, but has made two errors in her working. Which 2 steps contain an error from the previous line?

$$\frac{a}{2} - 3(a - 2) = 14$$

$$a - 3(a - 2) = 28 \quad \text{step 1}$$

$$a - 3a - 6 = 28 \quad \text{step 2}$$

$$-2a = 34 \quad \text{step 3}$$

$$a = -17 \quad \text{step 4}$$

(A) Steps 1 and 3                      (B) Steps 2 and 3                      (C) Steps 2 and 4                      (D) Steps 1 and 2

12. In the 2009 Tour de France, Cadel Evans was the fastest Australian over the 40.5 km time trial course. He completed the course in 49 mins and 44 seconds. What was his average speed for the course in metres per second?

(A)  $8.19 \times 10^{-4} \text{ m/s}$                       (B)  $1.357 \times 10^{-1} \text{ m/s}$                       (C)  $8.19 \times 10^1 \text{ m/s}$                       (D)  $13.57 \text{ m/s}$

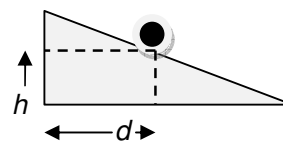
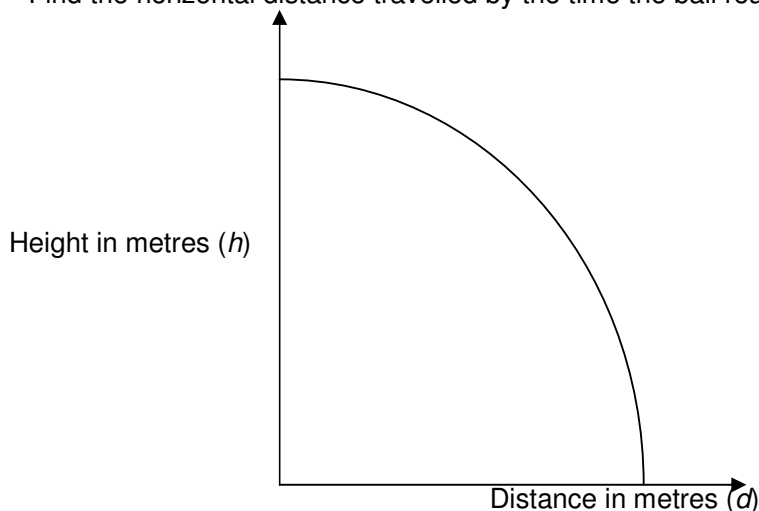
13. Two pieces of wood are cut measuring 1.4m and 2.5m. If the two pieces are placed end to end what would be their maximum possible measurement?

(A) 3.50m                      (B) 3.85m                      (C) 3.95m                      (D) 4.00m

***This information relates to question 14 and 15***

14. Politizio potato chips are packed following a normal distribution with a mean of 100g and a standard deviation of 3g. Quality control will reject packets whose weight is more than one standard deviation above the mean. What would be the maximum weight accepted by the company?
- (A) 94                      (B) 97                      (C) 103                      (D) 106
15. If the company packages 3725 packets each day how many would be rejected?
- (A) 596                      (B) 1192                      (C) 1267                      (D) 2533
16. Paul the octopus was given the task of selecting which team would win each game that Germany played in the Football World Cup. For each game two identical boxes containing food were placed in his tank, each labelled with a team name. Paul was successful in predicting 8 games in a row. What is the closest probability of that happening?
- (A)  $3.9 \times 10^{-3}$                       (B) 0.125                      (C) 0.5                      (D)  $3.9 \times 10^3$
17. Francis has a credit card with an interest rate of 0.045% per day and no interest free period. She used the credit card to pay for car repairs costing \$575 and paid the account after 15 days. What is the total amount, including interest, that she paid for the repairs?
- (A) \$388.13                      (B) \$575.26                      (C) \$578.88                      (D) \$963.13

18. A ball is rolled down a ramp such that  $h = -0.4d^2 + 10$ , where  $h$  is the height in metres above the ground and  $d$  is the horizontal distance in metres from the start of the ramp. Find the horizontal distance travelled by the time the ball reaches the floor.



- (A) 5m                      (B) 10m                      (C) 15m                      (D) 30m
19. The table shows the repayment per \$1000 on a monthly reducible loan.

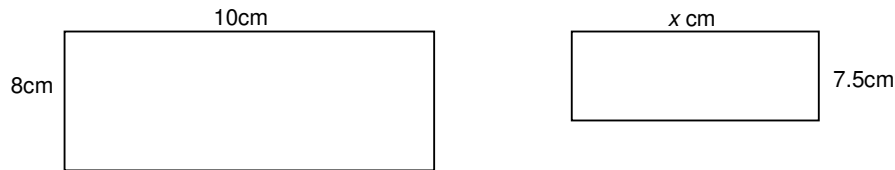
Interest rate p.a.
--------------------

Term in years	7%	7.25%	7.50%	7.75%	8%	8.25%	8.50%
5	19.8012	19.9194	20.0379	20.1570	20.2765	20.3963	20.5164
10	11.6108	11.7401	11.8702	12.0011	12.1328	12.2653	12.3985
15	8.9883	9.1286	9.2701	9.4128	9.5566	9.7014	9.8474
20	7.7530	7.9036	8.0559	8.2095	8.3644	8.5207	8.6782
25	7.0678	7.2281	7.3899	7.5533	7.7182	7.8875	8.0522
30	6.6530	6.8218	6.9921	7.1641	7.3377	7.5127	7.6891

The amount paid per month on a loan of \$120 000 over 20 years at 7.75% would be?

- (A) \$8.2095                      (B) \$164.19                      (C) \$820.95                      (D) \$985.14

20. Find the value of  $x$  to three decimal places given that rectangle A is similar to rectangle B.



- (A) 1.665 cm                      (B) 9.667 cm                      (C) 9.375 cm                      (D) 9.500 cm

21. Hornsby Council wildlife officers are trying to estimate the size of the bat population at Fagen Park. They capture 60 bats, tag them, and then release them. Later 50 bats are caught and 7 of those have tags. The size of the bat population can be estimated as:

- (A) 110                      (B) 430                      (C) 2100                      (D) 3000

22. The back to back stem and leaf plot shows the marks obtained on a class assignment.

MARKS OBTAINED		
Girls		Boys
	0	8
6	1	7
7 4 3	2	0 X 7
9 8 8 5 3	3	2 4 4 6 9
7 5 5 2	4	1 3 5

The number represented by  $X$  could **NOT** be :

- (A) 0                      (B) 4                      (C) 7                      (D) 9

## SECTION II

78 Marks

Attempt questions 23-28.

Allow approximately 2 hours.

Question 23 (13 marks) Start a new booklet

a) Make  $y$  the subject of  $x = \sqrt{6y + 3}$

2

b) This cumulative frequency histogram shows the number of people who attended a cinema on a certain day.



i) How many people attending the cinema were aged between 40 to 49 years?

1

ii) Estimate the median age of the group.

1

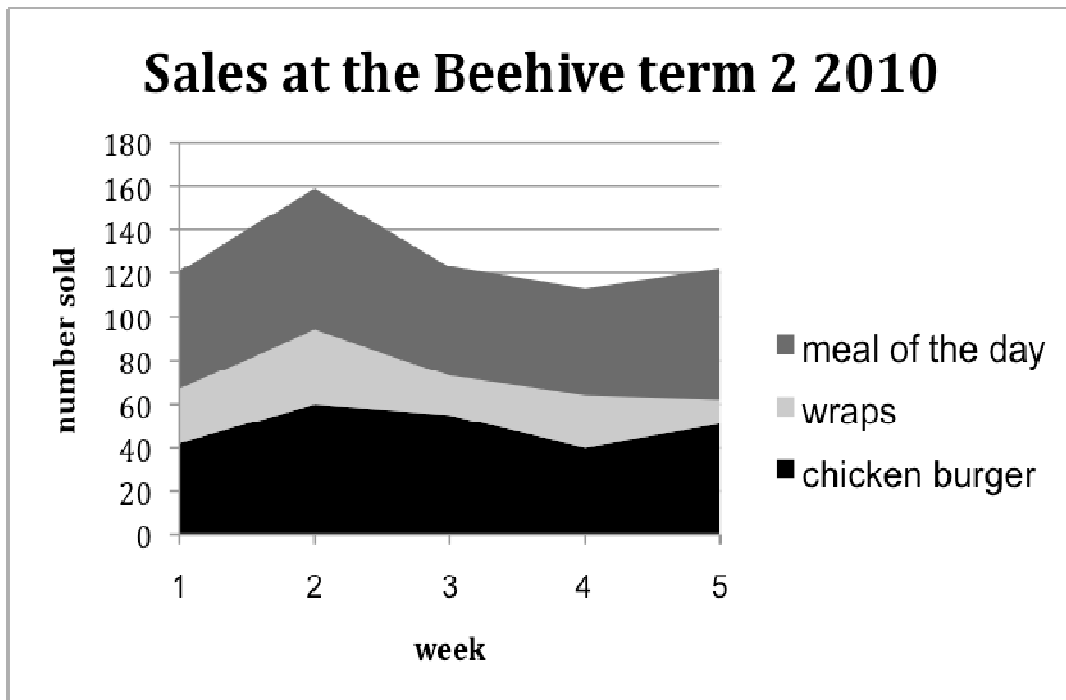


**Question 23 continued**

- c) Researchers have developed a new test for diabetes and have tested it on a group of patients. The results are shown in the table below:

	Positive test result	Negative test result	Totals
Patients with diabetes	16	4	20
Patients without diabetes	24	<b>A</b>	380
Totals		<b>B</b>	400

- i) Write down the missing values of A and B in your answer booklet. **2**
- ii) What percentage of the patients had diabetes? **1**
- iii) What is the chance that a patient with diabetes will be correctly identified by this test? **1**
- iv) How many of the tests gave the wrong result? **1**
- d) This chart shows the number and type of meals sold at the Beehive over the first 5 weeks of Term Two. Use this information to answer the following:

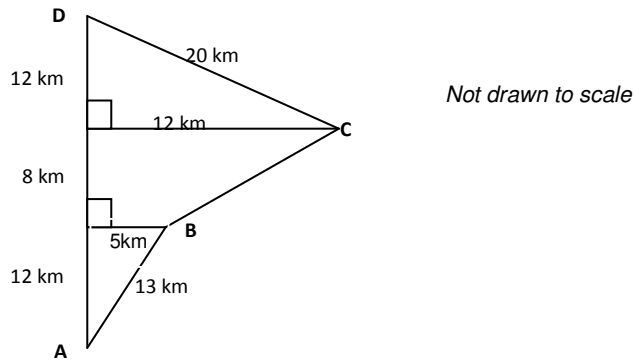


- i) How many wraps were sold in week 3? **1**
- ii) How many chicken burgers were sold over the 5 week period? **1**
- iii) Which is the most popular meal? Justify your answer. **2**

**Question 24 (13 marks) Start a new booklet.**

- a) A new by-pass, shown below, has been constructed between Kendallville and Rome City (AD). The old route will take you through the towns of Fort Wayne (B) and Sylvian Lake (C). How much shorter is the by-pass than the old route?

**2**



- b) Portia received the following scores for her recent assessments in Ancient History and Advanced English. Assume the distributions are normal.

	Score	Mean	Standard deviation	z score
Ancient History	65	62	15.7	0.19
Advanced English	65	62	11.15	

- i) Convert Portia's Advanced English score to z-scores (round to 2dp) **1**
- ii) Which was Portia's better performance? What statistics could she use to prove this to her parents? **2**

- c) A library contains 200 books in its young adults section. Some have been classified as Science Fiction and some as Adventure. If there are 45 Science Fiction books, 30 of which are classified as both Science Fiction and adventure, and 75 that were classified as adventure. Find the probability that a book chosen at random will

- i) NOT be an adventure book **1**
- ii) be a science fiction book OR an adventure book, but NOT both. **2**

**Question 24 continued**

- d) Ed earned a gross income of \$59 594. He had allowable tax deductions of \$2060. Each fortnight he pays PAYE tax of \$297.48. Answer the following questions using the table below.

Taxable Income	Tax on taxable income
\$1 - \$13 300	Nil
\$13 301 - \$23 500	6 cents for each \$1 over \$13 300
\$23 501 – \$46 000	\$612 plus 14 cents for each \$1 over \$13 300
\$46 001 - \$61 000	\$3 762 plus 38 cents for each \$1 over \$46 000
\$61 001 and over	\$9 462 plus 59 cents for each \$1 over \$61 000

- i) What is Ed's taxable income? 1
- ii) Use the table to calculate the amount of tax Ed should be paying on this income. 2
- iii) Is he eligible for a tax refund? Justify your answer with the appropriate calculations. 2

**Question 25 (13 marks) Start a new booklet**

- a) The local time in Uluru is +8:44 GMT and the local time in Sydney is +10:04 GMT. Calculate the difference in longitude between the two locations. 1

- b) Solve the following:

$$\frac{(3d+1)}{5} - \frac{(4d-7)}{10} = -2$$

2

- c) The number of flying foxes in a colony is given by

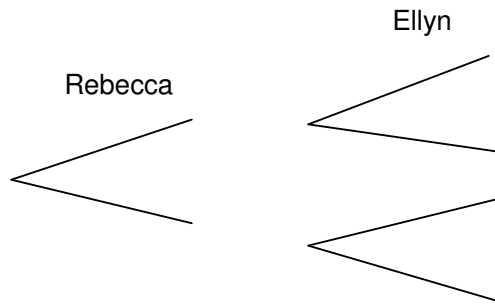
$$N=500(1+0.03)^t$$

Where  $N$  is the number of flying foxes and  $t$  is the time in months.

- i) Calculate the number of flying foxes in the colony after 3 months. 1
- ii) After how many months will the flying foxes will exceed 1000? 2

**Question 25 continued**

- d) Rebecca and Ellyn both wanted to go to a party. The chances that Rebecca is allowed to go to the party is  $\frac{7}{10}$ . Ellyn has a  $\frac{9}{10}$  chance of going to the party if Rebecca goes, but only a  $\frac{1}{5}$  chance of going if she doesn't go.



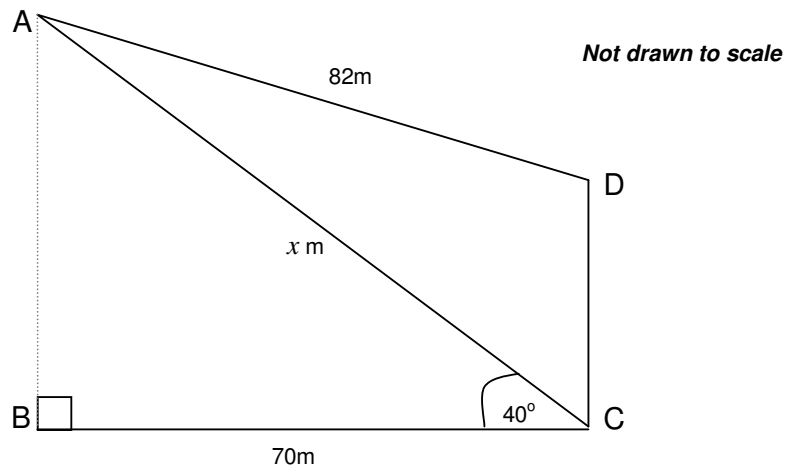
- i) Copy and complete the probability tree to show all the possible outcomes. **1**
- ii) What is the probability that both girls go to the party? **1**
- iii) What is the probability that only one of them will go to the party? **2**
- e) The number of chairs (C) in a restaurant varies inversely with the amount of space allowed per person (S). If  $0.75\text{m}^2$  is allowed per person, 120 people can be seated.
- i) Write an equation to show this relationship showing the constant of variation,  $k$ . **1**
- ii) Solve this equation to find the value of  $k$ . **1**
- iii) How many people can be seated if  $0.6\text{m}^2$  per person is allowed? **1**

**Question 26 (13 marks) Start a new booklet.**

- a) At the recent closing ceremony for the FIFA World Cup lights were shone into the sky. Some of the lights originated on the pitch at ground level, and others from the top of the stadium. Both sets of lights were angled in a way that they intersected over the centre of the pitch, as shown in the diagram below.



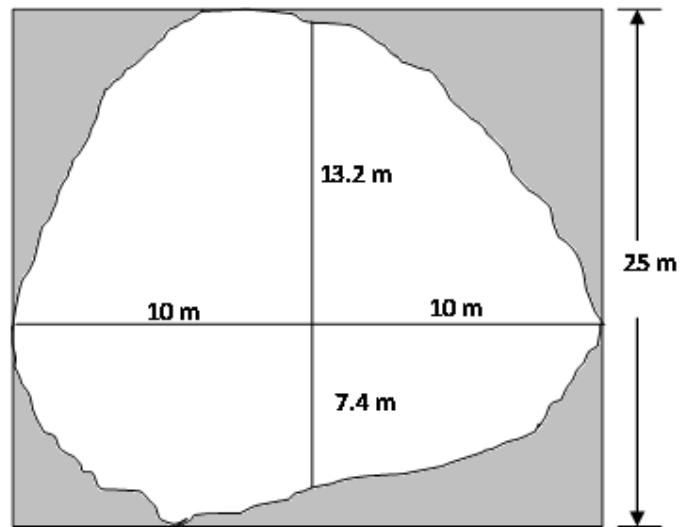
AD is the ray of light shone from the top of the stadium, where D is directly above C. AC is the ray of light shone from ground level. The rays of light intersect in the centre of the field, 70m from the base of the stadium. The top ray of light is measured to be 82m in length.



- i) Show that AC, the distance from the light on the pitch to where the rays intersect is 91.4m. **2**
- ii) Calculate the angle of elevation that the light at D will need to be set at to reach A. **3**

**Question 26 continued**

b) The frog pond in Centenary Park is surrounded by concrete as shaded in this diagram.



- i) Use Simpson's Rule to calculate the surface of the pond. 2
- ii) Calculate the area that will be concreted. 2

c) The Babes play 12 basketball games at their home court and 12 games at their opponents' court. The basketball scores for the Babes are listed in the table below:

Home	10	12	12	16	18	26	34	36	44	44	45	58
Away	10	12	12	16	16	18	22	23	26	30	38	40

Home matches 5-number summary: { 10, 14, 30, 44, 58 }

- i) Calculate a 5-number summary for the away games and construct a double box and whisker plot on the answer sheet provided. 2
- ii) Compare and contrast the Babes' performance at their home and away games, comment on the consistency and on the spread of the scores. 2

**Question 27 (13 marks) Start a new booklet**

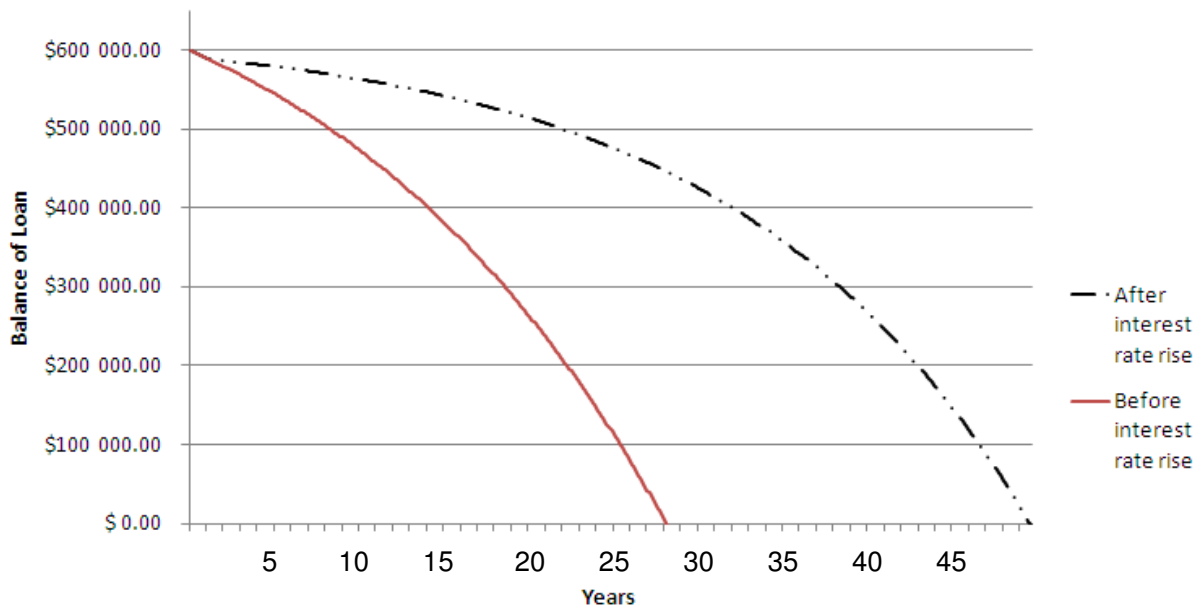
- a) Jane has taken some measurements of a field. From her position at O, she has calculated the corners of the field to be on a bearing of A  $028^\circ$ , B  $155^\circ$ , C  $227^\circ$  and D  $340^\circ$ . From O, the distances to A, B, C and D are 74m, 93m, 102m and 81m respectively.

**Draw a neat sketch of this field.**

- i) Show that  $\angle BOC = 72^\circ$  1
- ii) Calculate the distance from B to C 2
- iii) Calculate the area of  $\triangle COB$  2

- b) Home loan projection for Mr and Mrs William:

**Mr and Mrs William's Home Loan**



Rory and Amy William have a housing loan. Unfortunately the interest rate on their mortgage increased by 1.6% at one point in the first 10 years. The graphs above show the balance of their loan over time before the rate increase (solid) and after the rate increase (dotted). Amy and Rory cannot afford to increase their repayments.

- i) After how many years did the interest rate rise occur? 1
- ii) How much longer will it take them to pay off the loan? 1
- iii) How long would it have taken to pay off the home loan if the interest rate had not increased? 1
- iv) Using your answer from part iii) and referring to the graph, determine by how much Rory and Amy have reduced the balance of their loan after the interest rate rise? 1

- c) Simon and Rachel are getting married in Perth ( $31^{\circ}\text{S}$ ,  $115^{\circ}\text{E}$ ) on Friday afternoon. Simon's Best man David is flying in from Hong Kong ( $22^{\circ}\text{N}$ ,  $115^{\circ}\text{E}$ ) and will arrive on Thursday morning at 6:05am.

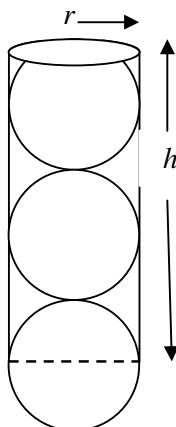
- i) What is the distance in kilometres between the two cities? 2  
 (Given radius of Earth  $\simeq 6400\text{km}$  or  $1\text{M} \simeq 1.852\text{km}$ )
- ii) If David's plane travels at  $750\text{ km/h}$ , what time would the plane take off from Hong Kong to arrive at 6:05am on the Thursday? 2

**Question 28 (13 marks) Start a new booklet**

- a) Pearl has a credit card which has no interest-free period and charges an annual rate of 12.75%.

- i) Find the daily interest rate. 1
- ii) Find the amount of interest charged on a purchase of \$152.95 if the full debt is repaid 21 days later. 1

- b) A plastic container for three tennis balls is designed with a hemispherical base and a cylindrical body. Three balls are to fit snugly inside the container. Each ball has a diameter of 6cm. If a lid is placed on top of the container it will just touch the top tennis ball. The cylinder has radius  $r$  and height  $h$ .



- i) Find the values of  $h$  and  $r$ . 2
- ii) Find the total surface area of plastic which will be required to make the container (without the lid). Give your answer correct to 1 decimal place. 2



- c) Dave is setting up a small business where he plans to build and sell bookshelves. To begin the business he needs to purchase some equipment which costs him \$600. Each shelf costs \$140 in materials. He then sells the bookshelf for \$200 each.

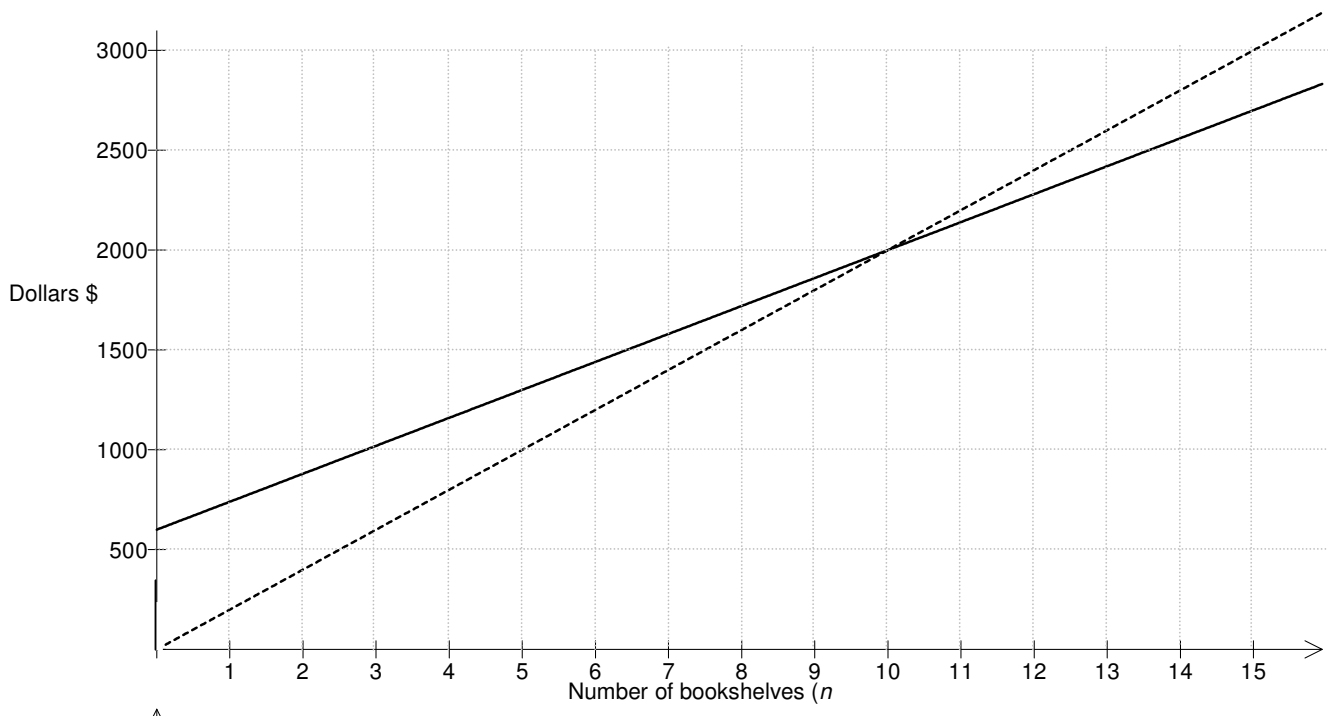
The cost ( $C$ ) associated with the number of shelves ( $n$ ) that Dave makes can be modelled by the equation:

$$C=140n+600$$

The income ( $I$ ) that Dave makes can be modelled by the equation:

$$I=200n$$

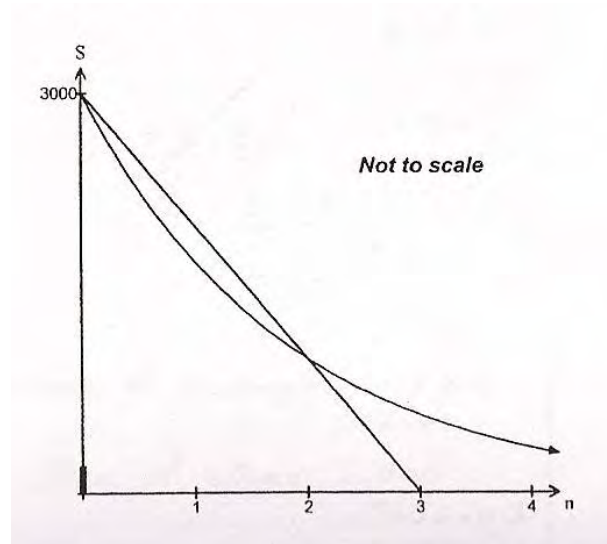
The graphs are shown below:



- i) Explain the significance of the point where the two lines on the graph cross. **1**
- ii) Show that the profit that Dave makes is  $60n - 600$  **1**
- iii) Calculate the profit he makes after completing 50 bookshelves. **1**

**Question 28 continued**

- d) Ellen bought a computer for \$3000. Using the method of straight-line depreciation, the salvage value ( $S$ ) of the computer will be zero in 3 years as shown by the straight line on the graph below. Using the method of declining balance with a depreciation rate of  $R\%$ , the salvage value is represented by the curved line on the graph below.

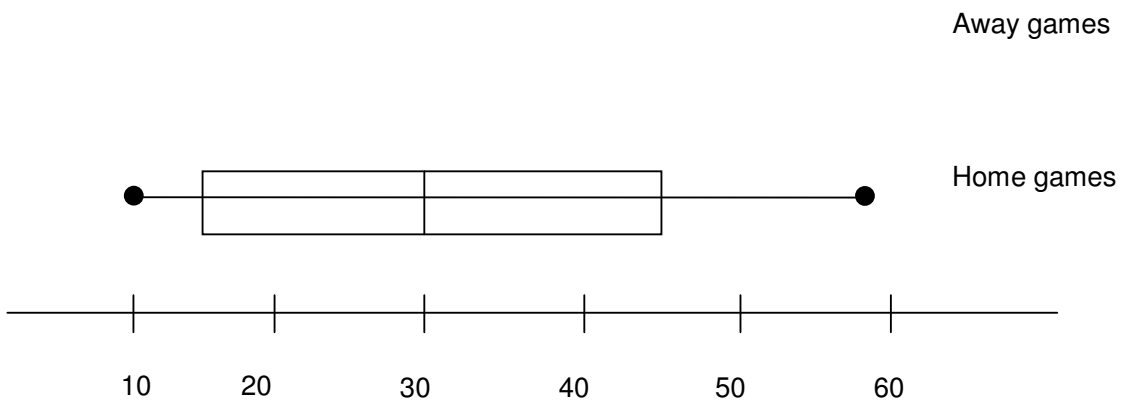


- i) How many years will it take for the salvage value of both methods to be equal? **1**
- ii) Find the value of  $R$  correct to 2 decimal places **3**

**END OF ASSESSMENT**

Student number: \_\_\_\_\_

Answer sheet to Question 26 c ii



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

Q23 a)  $x = \sqrt{6y+3}$   
 $x^2 = 6y+3$   
 $6y = x^2 - 3$   
 $y = \frac{x^2 - 3}{6}$

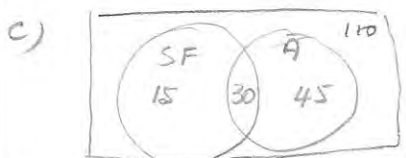
- b) (i) 20 people  
 (ii) Median = 37
- c) (i) A = 356 B = 360  
 (ii) % with diabetes =  $\frac{20}{400} \times 100 = 5\%$   
 (iii)  $\frac{16}{20} \times 100 = 80\%$   
 (iv)  $24 + 4 = 28$

- d) (i) 20  
 (ii)  $40 + 60 + 58 + 40 + 50 = 248$   
 (iii) Meat of the day - width of the strip is constant. - bigger also.

Q24 a) By pass = 32km

Old route =  $13 + \sqrt{113} + 20$   
 $= 43.63 \text{ km}$   
 $\therefore \text{Diff} = 43.63 - 32$   
 $= 11.63 \text{ km}$   
 $\hat{=} 12 \text{ km (nearest km)}$

b) (i)  $z = \frac{65-62}{11.15}$   
 $= 0.27$   
 (ii) Advanced English - higher z-score



c) (i)  $P(A) = \frac{125}{200}$   
 $= \frac{5}{8}$   
 $P(A \cup SF) = \frac{60}{200}$   
 $= \frac{3}{10}$

d) (i) Taxable income  
 $= 59594 - 2060$   
 $= \$57534$   
 (ii) Tax =  $3762 + 0.38(57534 - 46000)$   
 $= 3762 + 4382.92$   
 $= \$8144.92$   
 (iii) PAYE totals =  $297.48 \times 26$   
 $= \$7734.48$   
 No refund as he has only paid \$7734.48 & needs to pay \$8144.92

Q25 a) Uluru + 8:44  
 Sydney + 10:04  
 Time difference 1 hr 20 mins  
 1 hr =  $15^\circ$   
 $\therefore$  1 hr 20 mins =  $15 + 5$   
 $= 20^\circ$  longitude

b)  $\frac{3d+1}{5} - \frac{4d-7}{10} = -2$   
 $\times 10$   $2(3d+1) - 1(4d-7) = -20$   
 $6d + 2 - 4d + 7 = -20$   
 $2d + 9 = -20$   
 $2d = -29$   
 $d = -14.5$

c)  $N = 500(1 + 0.03)^t$

(i)  $t = 3$

$$N = 500(1.03)^3$$

$$= 546.3635$$

$$= 546 \text{ f.f.}$$

(ii)  $500(1.03)^t > 1000$   
 $1.03^t > 2$

$t = 10 \quad 1.03^{10} = 1.34$

$t = 25 \quad 1.03^{25} = 2.09$

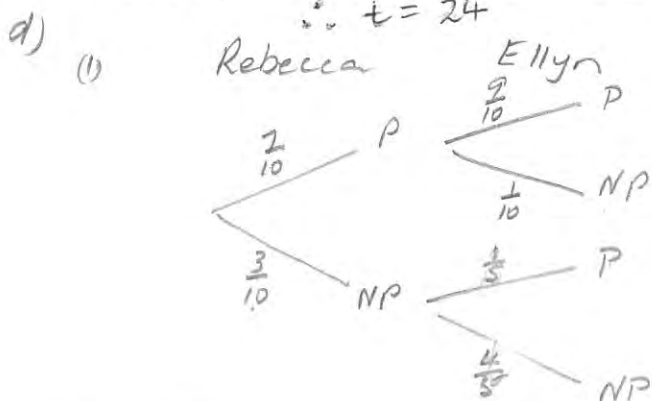
$t = 23 \quad 1.03^{23} = 1.97$

$t = 24 \quad 1.03^{24} = 2.03$

$t = 23.5 \text{m} \quad 1.03^{23.5} = 2.0029$

exceed 1000 in 23.5 months

$\therefore t = 24$



(ii)  $P(\text{both girls}) = \frac{2}{10} \times \frac{2}{10}$   
 $= \frac{63}{100}$

(iii)  $P(\text{only 1 going to party}) = \frac{2}{10} \times \frac{1}{10} + \frac{3}{10} \times \frac{1}{5}$   
 $= \frac{7}{100} + \frac{3}{50}$   
 $= \frac{13}{100}$

e) i)  $C \propto \frac{1}{S}$

$\therefore C = \frac{k}{S}$

(ii)  $120 = \frac{k}{0.75}$

$\therefore k = 90$

(iii)  $C = \frac{90}{0.6}$   
 $= 150 \text{ people}$

Q26

a) (i)  $\cos 40 = \frac{70}{x}$

$\therefore x = \frac{70}{\cos 40}$

$\cos 40$

$= 91.3785 \dots$

$\therefore AC = 91.4 \text{ m}$

(ii)  $\frac{91.37 \dots}{82} = \frac{82}{\sin 50}$

$\sin \angle CDA = \sin 50$

$\sin \angle CDA = \frac{91.37 \dots \times \sin 50}{82}$

$= 0.8536 \dots$

$\therefore \angle CDA = 58^\circ 36' \text{ or } 121^\circ 23'$

$\therefore$  angle of elevation

$= 121^\circ 23' - 90^\circ$

$= 31^\circ 23'$

b) (i)  $A = \frac{h}{3} \{d_F + 4d_m + d_L\}$

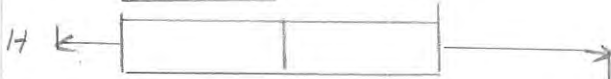
$= \frac{10}{3} \{0 + 4 \times 7.4 + 0\} + \frac{10}{3} \{0 + 4 \times 13.2 + 0\}$

$= 98.666 \dots + 176$

$= 274.6 \text{ m}$

(ii) Concrete area  $= 25 \times 20 - 274.6$   
 $= 225.3 \text{ m}^2$

c) (i)  $\{10, 14, 20, 28, 40\}$



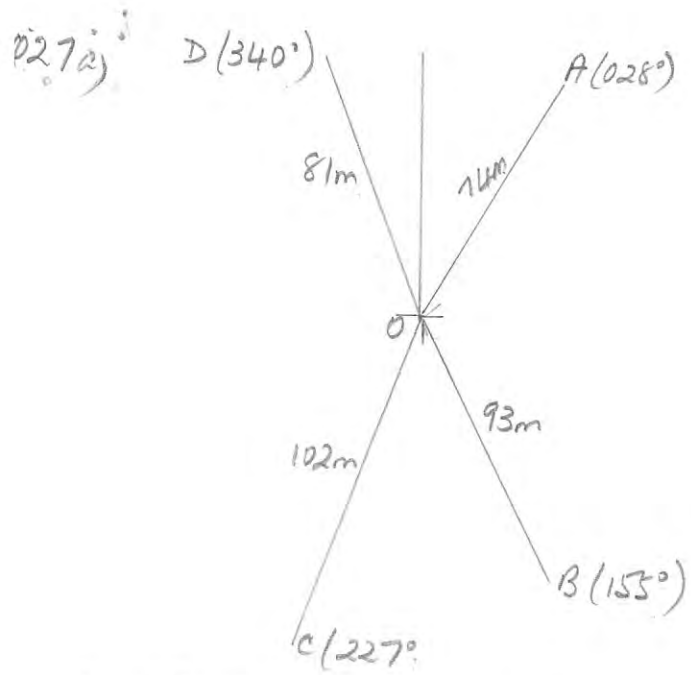
10 20 30 40 50 60

Played better on home ground

Range bigger. H

Median much higher for H.

Away games positively skewed.



1)  $\angle BOC = 227^\circ - 155^\circ$   
 $= 72^\circ$

ii)  $BC^2 = 102^2 + 93^2 - 2 \times 102 \times 93 \cos 72$   
 $= 13190.329 \dots$   
 $\therefore BC = 114.849$   
 $= 114.8 \text{ m}$

iii) Area  $\triangle COB = \frac{1}{2} \times 102 \times 93 \sin 72$   
 $= 4510.86 \dots$   
 $= 4510.9 \text{ m}^2$

- b) i) 2 years  
 ii) 22 years  
 iii) 28 years  
 iv)  $\$60000 - \$460000 \div \$140000$

c) i) H.K to P =  $31 + 22$   
 $= 53^\circ$   
 $= \frac{53}{360} \times 2 \times \pi \times 6400 \div 5889.36 \text{ km}$   
 $= 5920.15$   
 $= 5920.2 \text{ km}$

ii)  $D = T \times S$   
 $T = \frac{D}{S}$   
 $= \frac{5920.2}{750}$   
 $= 7.89 \dots \text{ hours}$   
 $= 7.9 \text{ hr}$   
 $= 7 \text{ hr } 54 \text{ min}$   
 10.06 pm Wed.

Q28a) i) 0.00035  
 ii)  $I = 152.95 \times 0.00035 \times 21$   
 $= \$1.12$

b) i)  $h = 15 \text{ cm}$   
 $r = 30 \text{ cm}$   
 ii)  $SA = 2\pi rh + \frac{1}{2} \times 4\pi r^2$   
 $= 2\pi \times 3 \times 15 + 2 \times \pi \times 9$   
 $= 339.292$   
 $= 339.3 \text{ cm}^2 \text{ (2dp)}$

c) i) Meet - break even point  
 start to make a profit

ii)  $P = I - C$   
 $= 200n - (140n + 600)$   
 $= 60n - 600$

iii)  $P = 60 \times 50 - 600$   
 $= 92400$

d) i) 2 years  
 ii)  $S = 3000 - 1000n$  (i)  
 $S = 3000(1-R)^n$  (ii)

where  $n=2$   
 $S = 1000$  (i)  
 $1000 = 3000(1-R)^2$   
 $\frac{1}{3} = (1-R)^2$   
 $\sqrt{\frac{1}{3}} = 1-R$   
 $R = 1 - \sqrt{\frac{1}{3}}$   
 $= 0.423 \dots$   
 $= 0.42$   
 or 42.3%  
 42%