

Student Number: \_\_\_\_\_



2004  
TRIAL HIGHER SCHOOL CERTIFICATE  
EXAMINATION

# General Mathematics

Examination Date: 20th August 2004

Weighting: 45%

(100 Marks)  
Examiner: Mrs N. Robertson

## General Instructions

- Reading Time - 5 minutes
- Working Time - 2½ hours
- Write using a blue or black pen
- Write your student number on every booklet
- Calculators may be used
- A Formulae Sheet is provided.

## Section I pages 2 – 6

Total marks (22)

- Attempt Questions 1-22
- Answer on the Multiple Choice answer sheet provided
- Allow about 30 minutes for this section

## Section II pages 7 - 14

Total marks (78)

- Attempt Questions 23 – 28
- Answer on the paper provided. Start a new page for each question.
- Allow about 2 hours for this section

## SECTION I Total Marks (22)

Attempt Question 1 – 22  
Allow about 30 minutes for this section

Select the alternative A, B, C or D that best answers the question.  
Circle your answer on the multiple-choice answer sheet provided.

The stem and leaf plot below gives the age of spectators at a basketball match. Use it to answer Questions 1 and 2

| Stem | Leaf              |
|------|-------------------|
| 0    | 1 2 5 7           |
| 1    | 2 3 3 5 7 7       |
| 2    | 2 3 4 4 5 5 6 8 9 |
| 3    | 1 2 2 2 3 5 8 9   |
| 4    | 1 1 2 2 3 4 7 8   |
| 5    | 2 3 4 5 8         |

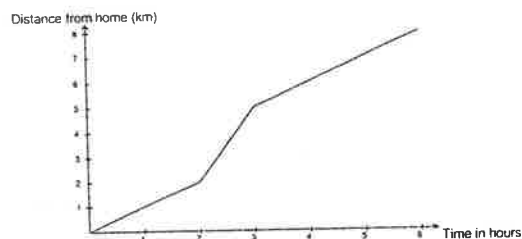
- The median age of the spectators is:  
A. 31                      B. 31.5                      C. 32                      D. 30
- The percentage of spectators who were older than 43 is:  
A. 80%                      B. 8%                      C. 20%                      D. 22.5%
- The correct simplification of  $8x^5 - 2x^5$  is:  
A. 4                      B. 6                      C.  $6x$                       D.  $6x^5$
- Hector borrowed \$10 000 at an interest rate of 8% per annum compounded quarterly. He has quarterly repayments of \$500 to make on this reducing balance loan. The balance sheet for this loan is shown below.

| Quarter | Balance at start of quarter | Quarterly interest | Quarterly repayment | Balance at end of quarter |
|---------|-----------------------------|--------------------|---------------------|---------------------------|
| 1       | \$10 000                    | \$200              | \$500               | \$9 700                   |
| 2       | \$9 700                     | (I)                | \$500               |                           |

The quarterly interest for the second quarter (I) is:

- A. \$168                      B. \$194                      C. \$200                      D. \$388

5. A family is travelling on holidays. Between which hours are they travelling at the greatest speed?

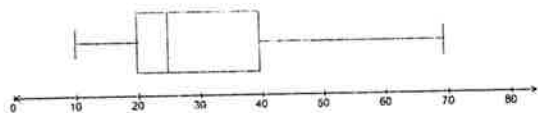


- A. 0 to 2      B. 2 to 3      C. 3 to 5      D. 5 to 6

6. After 3 months of football training Agamemnon had reduced his weight by  $12\frac{1}{2}\%$  to 73.5 kg. His original weight was:

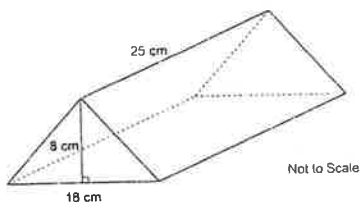
- A. 81 kg      B. 82 kg      C. 83 kg      D. 84 kg

7. A set of data is displayed on the box-and-whisker plot below. The interquartile range for this set of data is:



- A. 5      B. 15      C. 20      D. 60

8. A prism has a triangular cross-section with dimensions as indicated in the diagram below.



What is the volume of this prism to the nearest cubic centimetre?

- A. 144      B. 450      C. 1800      D. 3600

9. A bag contains three times as many red marbles as blue marbles. If one marble is chosen at random, the probability that it will be a blue marble is:

- A.  $\frac{1}{2}$       B.  $\frac{2}{3}$       C.  $\frac{1}{3}$       D.  $\frac{1}{4}$

10.  $2.3 \times 10^{-3}$  is the same as:

- A.  $0.23 \times 0.01$       B.  $0.0023 \times 0.01$       C.  $0.00023 \times 0.1$       D. 23000

11. Troy bought a lounge and dining suite for \$3 500 on interest free terms over 3 years. He pays a deposit of 10%. The monthly repayment will he have to make are:

- A. \$87.50      B. \$94.44      C. \$97.22      D. \$262.50

12. Given that  $x^2 = 2.45$ , the value of  $x$  to 2 significant figures is:

- A. 1.56      B. 1.6      C. 6.0      D. 1.2

13. Apollo wishes to have saved \$20 000 after 7 years. He will do this by making regular annual payments into a 'sinking fund' account. What annual payment must he make if the account is offering 11% p.a. compounding annually.

- A. \$1 002.30      B. \$2 044.31      C. \$2 357.87      D. \$5 931.89

14. Solve for  $x$ :  $2(x+3) = -4$

- A.  $-3\frac{1}{2}$       B. -5      C. 1      D. -20

15. Paris caught a sample of 700 salmon from a river. He tagged the salmon and released them back into the river. The next day he caught 40 salmon and found 8 had been tagged. The estimated number of salmon in the river would be:

- A. 140      B. 3 000      C. 3 500      D. 7 000

16. Sydney is located  $150^\circ$  east of Greenwich. If the time is 4 pm Tuesday in Greenwich, which of the following statements is true. Assume no daylight saving.

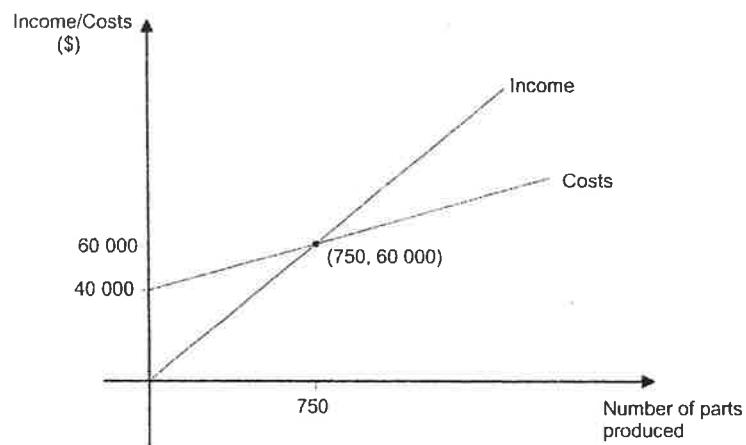
- A. It will be 4 am Wednesday in Sydney  
B. It will be 4 am Thursday in Sydney  
C. It will be 2 am Wednesday in Sydney  
D. It will be 2 am Monday in Sydney

17. The results from a state mathematics competition were given as z-scores. The mean of the results was 42 and the standard deviation was 12.

If Helen scored a z-score of 2, what was her actual mark?

- A. 48                      B. 66                      C. 78                      D. 96

18. A small business manufactures car parts. The income and the cost associated with producing these car parts during the first six months of operation are shown on the graph.



How many parts must the business produce before it breaks even?

- A. 750                      B. 20 000                      C. 40 000                      D. 60 000

19. Menelaus works for 6 normal hours and 4 hours overtime at time and a half. He was paid a total of \$120. What is his normal hourly rate of pay?

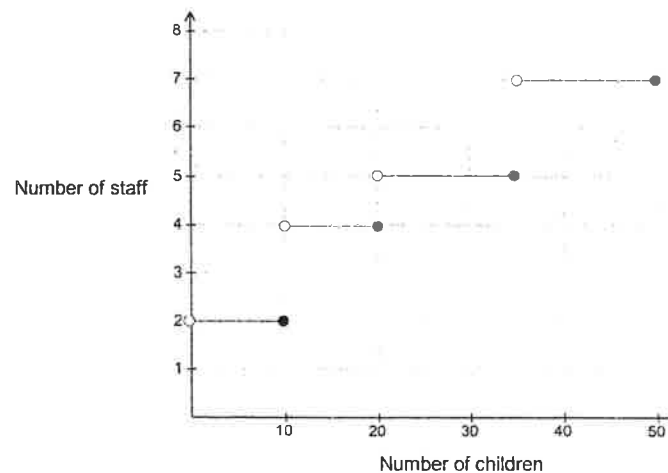
- A. \$10                      B. \$12                      C. \$15                      D. \$18

20. The formula  $s = ut + \frac{1}{2}at^2$  is rearranged to make  $a$  the subject. The result is:

- A.  $a = \frac{2s - ut}{t^2}$                       B.  $a = \frac{2(s - ut)}{t^2}$                       C.  $a = \frac{2s + 2ut}{t^2}$                       D.  $a = t^2(2s - 2ut)$

21. At a childcare centre the number of staff required for the number of children in attendance is described by the following graph.

If the number of children at the centre dropped from 45 to 30, how many staff would no longer be required?



- A. 2                      B. 6                      C. 8                      D. 10

22. In how many ways can a captain and vice-captain be chosen from a tennis squad of 6 people?

- A. 11                      B. 12                      C. 15                      D. 30

**End of Section I**

## Section II

Total Marks (78)

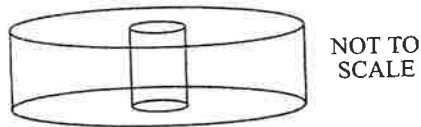
Attempt Questions 23 - 28

Allow about 2 hours for this section.

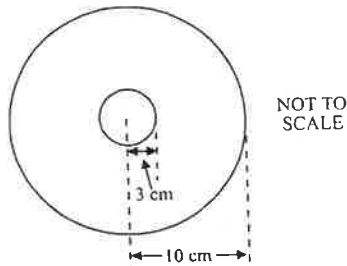
Answer all questions, starting each question in a new booklet with your name and question number at the top of the page.

### Question 23 (13 marks) Start a new booklet.

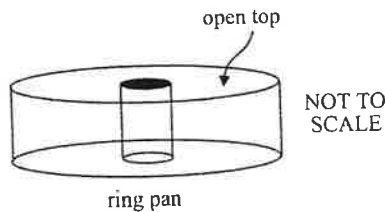
- (a) A solid in the shape of a cylinder has a smaller cylinder drilled through its centre.



The cross-sectional area of the solid is in the shape of an annulus with an outer radius of 10 cm and an inner radius of 3 cm.

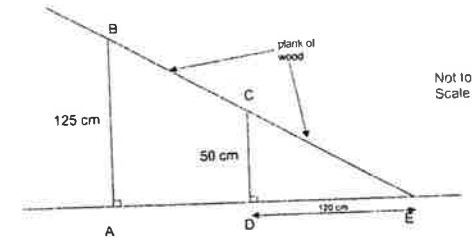


- Find the cross-sectional area of the solid.
- If the height of the solid is 5 cm, find the volume of the solid.
- A ring pan is used to bake cakes in, is identical in shape and dimensions to the solid but has an open top as shown below.



Cassandra needs a ring pan with a 2 litre capacity. Will this ring pan be suitable? Explain your answer using a calculation.

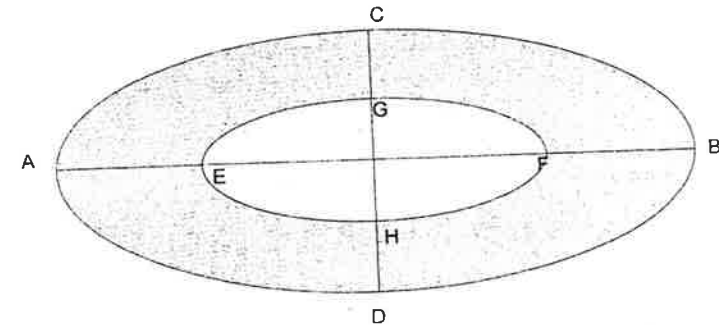
- (b) One end of a plank of wood rests at point  $E$  on the horizontal ground. The other end rests at  $B$  at the top of a vertical brick wall  $AB$ . A piece of timber,  $CD$ , is wedged vertically under the plank to support it.



- Write down the names of the two triangles in the diagram that are similar.
- Calculate the distance  $CE$ .
- What is the length of the plank?

- (c) The following shows two ellipses.  
 $AB = 28$  m,  $CD = 12$  m,  $EF = 16$  m and  $GH = 6$  m.

- (i) Find the shaded correct to 1 decimal place.



- (ii) Explain what is meant by the terms semi-major axis and semi-minor axis.

- (d) A ship sails due north, from a city ( $10^\circ\text{S}$ ,  $150^\circ\text{E}$ ) for 10 hours, at a speed of 18 knots. Find the new coordinates of the ship.

End of Question 23

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

- (a) Diomedes funds a small family business, which he would like to expand. His financial adviser tells him that, if he expands, there is a 40% chance of losing \$200 000 and a 60% chance of gaining \$150 000.

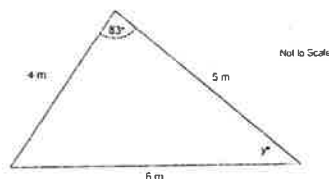
- (i) Calculate the financial expectation of this venture. 2
- (ii) Based on this result in part (i), would you recommend expansion? Give reasons for your answer. 1

- (b) Nine girls played basketball and netball. The number of goals scored by the girls throughout the season is recorded.

| Player     | A  | B  | C  | D  | E  | F  | G  | H  | I  |
|------------|----|----|----|----|----|----|----|----|----|
| Basketball | 16 | 18 | 19 | 23 | 25 | 27 | 28 | 30 | 30 |
| Netball    | 12 | 13 | 14 | 24 | 25 | 26 | 27 | 28 | 29 |

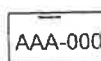
- (i) On the grid paper provided, display this data on a scatter plot. Allow the horizontal axis to be the number of goals scored in basketball (B). 2
- (ii) Describe the correlation between the two variables. 1
- (iii) The parent of Player A assumed that if you are good at scoring goals in netball you are also good at scoring goals in basketball. Comment briefly on this statement. 1
- (iv) On your scatter plot draw in a median regression line. 1
- (v) Determine the equation of this regression line in the form  $N = mB + b$ . 2

- (c) Use the sine rule to find the value of  $\gamma$  to the nearest degree. 2



- (d) The RTA recently announced an end to the production of the standard number plates in NSW because they have used all the possible combinations in the current three letters and three numbers style. They will be introducing a new number plate consisting of two letters, two numbers, two letters, as shown in the diagram.

Current Style



New Style

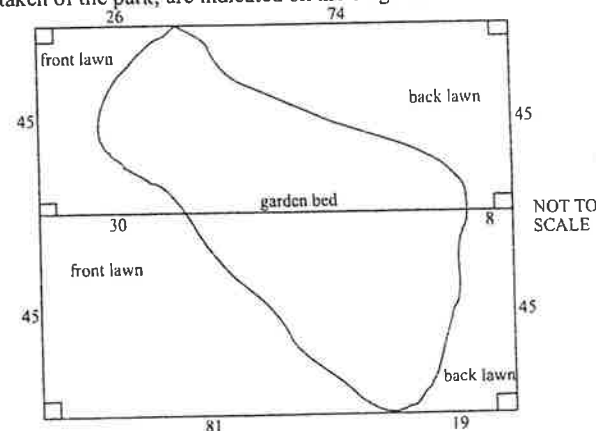


Does this new arrangement allow for more number plates than the current arrangement? Justify your answer (showing all calculations). 1

**End of Question 24**

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

- (a) A park is made up of a front lawn, a back lawn and a large garden bed. Measurements in metres, taken of the park, are indicated on the diagram below.



- (i) Find the approximate area of the front lawn using Simpson's Rule. 2
- (ii) What percentage of the park does the garden bed occupy? Express your answer as a percentage correct to 2 sig. figs. 4

- (b) A solid metal cone has a radius of 10 cm and a height of 25 cm.

- (i) Show that the volume of the cone is  $2618 \text{ cm}^3$  (4 sig. figs). 2
- (ii) If the cone is melted down and formed into a solid sphere calculate the radius of the sphere. (3 sig. figs). 2

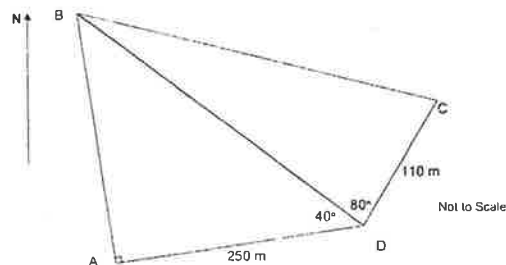
- (c) The number of people in a city is given by  $P = 25000(1.7)^{0.2t}$  where  $t$  is the number of years since 1998. The formula gives the number of people at the beginning of the year.

- (i) Find to the nearest 1 000, the population of the town at the beginning of the year 2 000. 1
- (ii) Use the 'guess check and refine method' to find during which year will the population reach 50 000. 2

**End of Question 25**

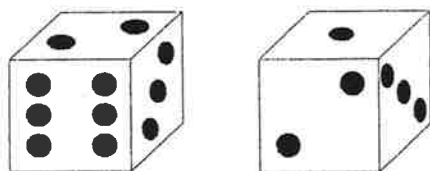
**Question 26 (13 marks) Start a new booklet.**

- (a) A sketch of a paddock ABCD is shown below.



- (i) Show that the length of BD is 326 m (nearest metre). 1
- (ii) Using the cosine rule calculate the length of the side BC. 2
- (iii) Calculate the area of triangle BDC (nearest  $\text{m}^2$ ). 2
- (iv) If the bearing of C from D is  $050^\circ$  calculate the bearings of the points B and A from the point D. 2

- (b) Two standard dice have faces numbered 1-6.



The two dice are rolled and the scores on the uppermost face on each die are noted. The smallest score is subtracted from the larger score. If both scores are equal, a score of zero is recorded.

- (i) List all possible scores. 2
- (ii) What is the highest possible recorded score? 1
- (iii) Find the probability that the score is 5. 1
- (iv) Which recorded score(s), occurred least often? 1
- (v) Find the probability that the score is less than 3. 1

**End of Question 26**

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

- (a) Sara's annual income as an engineer is \$53 000. She also earns \$4 200 a year as a part time consultant. Her allowable tax deductions total \$2 600.

- (i) Explain or show by calculation how the value of A (in the 3<sup>rd</sup> tax bracket) on the following tax scale is calculated to be 30c.  
(The scale does not include the Medicare levy). 2

| Taxable income    | Tax payable                                   |
|-------------------|-----------------------------------------------|
| \$0-\$6 000       | Nil                                           |
| \$6 001-\$20 000  | 17c for each \$1 over \$6 000                 |
| \$20 001-\$50 000 | \$2 380 plus A for each \$1 over \$20 000     |
| \$50 001-\$60 000 | \$11 380 plus 42c for each \$1 over \$50 000  |
| Over \$60 000     | \$15 580 plus 47c for every \$1 over \$60 000 |

- (ii) Show that Sara's taxable income is \$54 600. 1
- (iii) The total amount that Sara had to pay in tax was \$14 131. This amount included the medicare levy which was 1.5% of taxable income.  
Find the amount Sara paid for the Medicare levy. 2
- (iv) Sara's employer gave her a rise of \$12 a week. How much of this \$12 will she actually receive after she pays her tax and medicare levy? 1

- (b) The salvage value after 4 years for a car purchased using the declining balance method of depreciation is \$7 830.09. If the car was purchased for \$15 000 but was depreciated according to the straight line method of depreciation, what annual amount of depreciation, D, would it have to depreciate to have the same salvage value after 4 years? 2

- (c) When training "sniffer" dogs used for drug detection, a trial was set up. The results are shown below.

|                    | Drugs Detected | Drugs Not Detected | Total |
|--------------------|----------------|--------------------|-------|
| Bags with drugs    | 64             | 16                 | 80    |
| Bags without drugs | 21             | 49                 | 70    |
| Total              | 85             | 65                 | 150   |

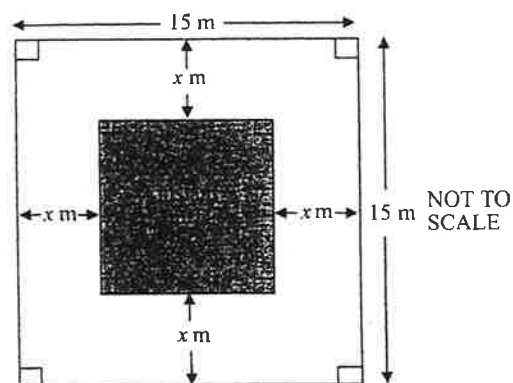
- (i) What percentage of bags containing drugs were correctly detected? 1
- (ii) What was the overall accuracy rate throughout the trial as a percentage? 2
- (iii) Assume the dogs maintained the same degree of accuracy after the trial.

If three bags containing drugs are brought past the dogs, what is the probability that the drugs in at least one of the bags will be detected? 2

**End of Question 27**

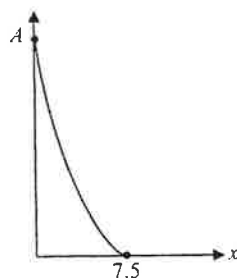
**Question 28 (13 marks) Start a new booklet.**

- (a) A square block of land has sides of length 15 m. A square piece of instant turf is to be laid on this land so that the centres of the squares coincide as indicated in the diagram below.



The perpendicular distance from the edge of the instant turf to the edge of the land is  $x$  m.

- (i) Show that the formula for the area,  $A$ , of the instant turf is  $A = (15 - 2x)^2$  2
- (ii) What would the value of  $A$  be if  $x = 4$ ? 1
- (iii) The graph of  $A$  against  $x$  is shown below.



- The graph is part of a parabola. Explain why the largest value of  $x$  is 7.5. 1
- (iv) What is the maximum value of  $A$ ? 1

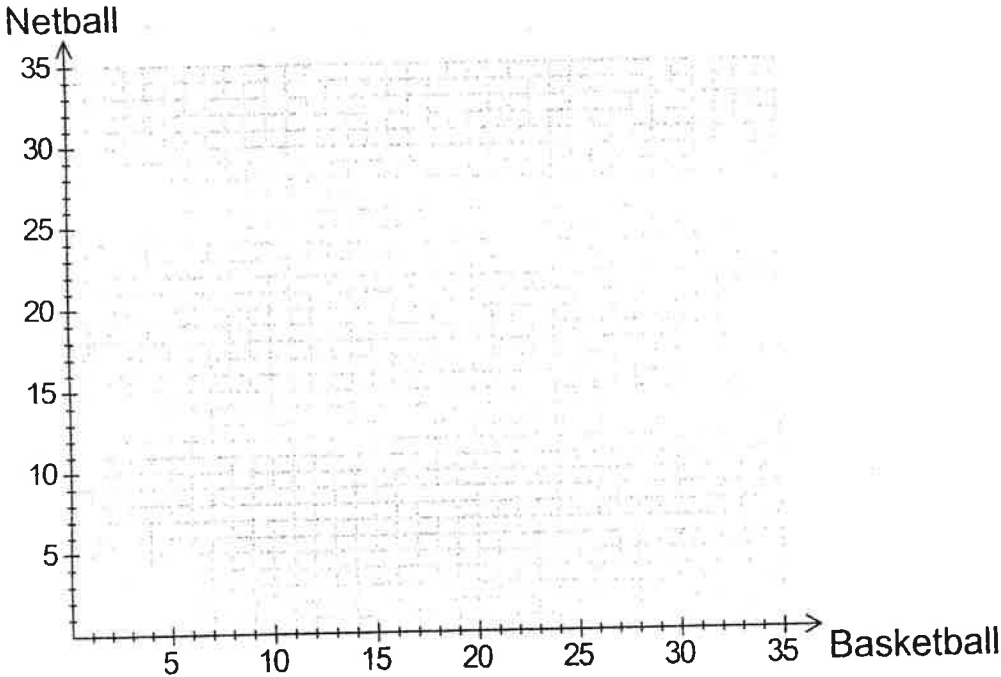
- (b) Achilles borrowed \$120 000 to buy a car. It is to be repaid in monthly instalments with interest charged at 9% p.a. compounding monthly over 6 years. Use the present value formula to find the amount of each instalment. (Show working) 3

- (c) A machine is set to produce rubber discs with a mean diameter of 8.00 cm and a standard deviation of 0.03 cm. The diameters are normally distributed.
- (i) Within what interval will 95% of diameters lie? 1
- (ii) An operator selects a disc at random and notes its diameter to be 9.00 cm. Briefly state what conclusions the operator can make. 2
- (d) (i) The cost ( $C$ ) of printing pamphlets is a fixed charge of \$ $P$  plus an additional charge of 8 cents per copy. Write this information as a formula. 1
- (ii) If the fixed charge is \$200 and Homer paid a total of \$700, how many copies did Homer print? 1

**END OF PAPER**

Student Number: \_\_\_\_\_

Use for Question 24 (b) parts (i), (ii), (iv) and (v)



Student Number: \_\_\_\_\_

*This page is to be detached, completed and handed in with your examination paper and writing booklets.*

**SECTION I**  
**MULTIPLE-CHOICE ANSWER SHEET**

*Circle the correct answer*

- |     |   |   |   |   |
|-----|---|---|---|---|
| 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 |

**End of Multiple-Choice Answer sheet**

# YR 12 2004 TRIAL HSC SOLUTIONS

## MULTIPLE CHOICE:

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

## Question 23

a) (i)

Cross-Sectional Area:

$$A = \pi(R^2 - r^2) \\ = \pi(10^2 - 3^2) \\ = 285.884 \dots$$

$$\therefore \text{Area} = 286 \text{ cm}^2 \text{ (nearest whole number)}$$

$$(ii) V = Ah \\ = 286 \times 5 \\ = 1430 \text{ cm}^3$$

$$\therefore \text{Volume} = 1430 \text{ cm}^3$$

$$(iii) V = 1430 \text{ cm}^3 \\ 1 \text{ cm}^3 = 1 \text{ mL}$$

$$\therefore \text{Capacity} = 1430 \text{ mL} \\ = 1.43 \text{ L}$$

$\therefore$  Ring pan is not suitable, as it is too small, i.e. not 2 L.

$$(d) D = s \times t \\ = 18 \times 10 \\ = 180 \text{ M}$$

$$1^\circ = 60 \text{ M}$$

$\therefore 3^\circ = 180 \text{ M}$ ; i.e. ship has changed its course by  $3^\circ$

new co-ordinates ( $7^\circ \text{S}, 150^\circ \text{E}$ )

b) i) Similar Triangles:  
 $\triangle ABE$  and  $\triangle CDE$

$$(ii) CE^2 = CD^2 + DE^2 \\ \therefore CE = \sqrt{50^2 + 120^2} \\ = 130 \text{ cm}$$

(iii) Since  $\triangle CDE \cong \triangle BAE$ ,

$$\frac{BE}{BA} = \frac{CE}{CD}$$

$$\frac{BE}{125} = \frac{130}{50}$$

$$BE = \frac{130}{50} \times 125 \\ = 325 \text{ cm}$$

$\therefore$  The plant is 3.25 metres

c) i) Area Ellipse:

$$A = \pi a b_1 - \pi a_2 b_2 \\ = \pi \times 14 \times 6 - \pi \times 7 \times 3 \\ = 263.893 - 75.398 \\ = 188.495 \\ = 188.5 \text{ m}^2$$

(ii) In an ellipse, the major axis is the longer axis, the minor axis is the shorter axis.

The semi-major axis is half of the major axis;

The semi-minor axis is half of the minor axis

Question 24

i)

i) Financial expectation:

$$FE = \$0.6 \times 150\,000 + (-0.4 \times 200\,000)$$

$$= \$90\,000 - \$80\,000$$

$$= \$10\,000$$

ii) Recommended expansion, as he will gain a profit of \$10 000. However, the expected gain is quite small compared with the possible losses.

b)

i) see grid

(i) High, Positive correlation

(ii) Since the points have a high positive relationship it suggests that players who scored a high number of goals in netball also score a high number of goals in Basketball. Therefore, the parents' statement would be considered as correct

(iv) see grid

(v) using (16, 12) and (28, 27)

$$\text{gradient} = \frac{27-12}{28-16} = \frac{5}{4}$$

$$\underline{5x + b} \quad 12 = \frac{5}{4} \times 16 + b$$

c)

$$\frac{\sin y}{4} = \frac{\sin 53}{6}$$

$$\therefore \sin y = \frac{4 \sin 53}{6}$$

$$\therefore y = 0.661697 \dots$$

$$\therefore y = 41.429 \dots$$

$$\therefore y = 41^\circ \text{ (nearest degree)}$$

d)

$$\text{Current Style} = 26 \times 26 \times 26 \times 10 \times 10 \times 10$$

$$= 17\,576\,000$$

$$\text{New Style} = 26 \times 26 \times 10 \times 10 \times 26 \times 26$$

$$= 45\,697\,600$$

$\therefore$  The new arrangement allows for more number plates than the current arrangement

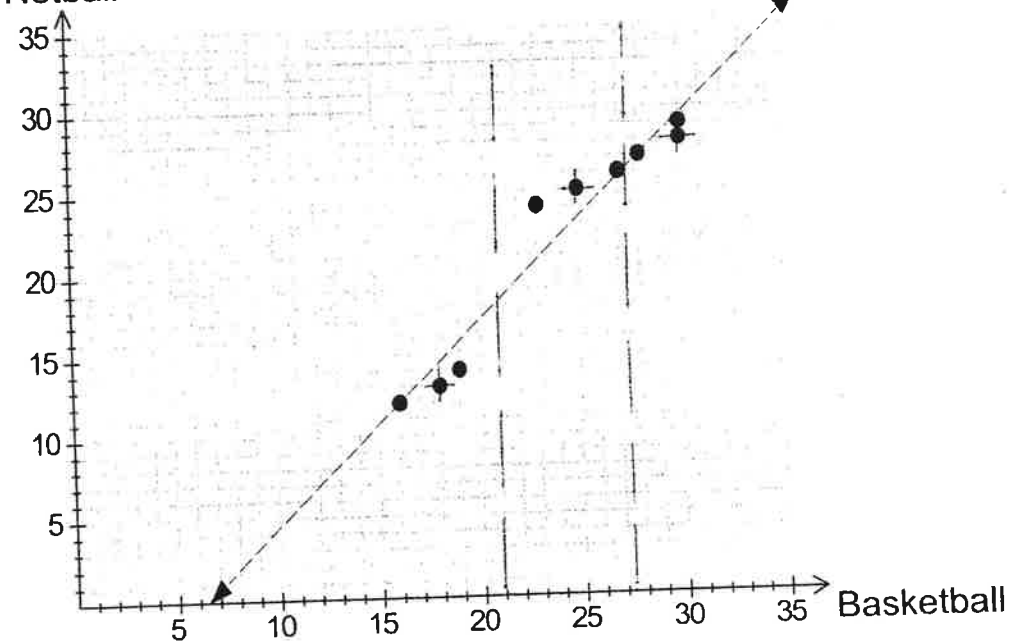
$$45\,697\,600 - 17\,576\,000$$

$$= 28\,121\,600$$

Solutions:Student Number: 2509070101

Use for Question 24 (b) parts (i), (ii), (iv) and (v)

Netball



### Question 25

a)

(i) Area front lawn:

$$A = \frac{h}{3} (d_1 + 4d_m + d_2)$$

$$= \frac{45}{3} (26 + 4 \times 30 + 81)$$

$$= 3405 \text{ m}^2$$

Area front lawn is  $3405 \text{ m}^2$

(ii) Area back lawn:

$$A = \frac{45}{3} (74 + 4 \times 18 + 19)$$

$$= 1875 \text{ m}^2$$

Area Park - Area Lawn

$$= (90 \times 100) - (3405 + 1875)$$

$$= 9000 - 5280$$

$$= 3720$$

$$\% \text{ garden} = \frac{3720}{9000} \times 100\%$$

$$= 41.33\% \dots$$

$$\% \text{ area} = 41\% \text{ (2 sig. figs.)}$$

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

$$= \frac{1}{3} \times \pi \times 10^2 \times 25$$

$$= 2617.993878$$

$$\therefore \text{Volume is } 2618 \text{ cm}^3 \text{ (4 sig. figs.)}$$

(ii)  $V_{\text{sphere}} = \frac{4}{3} \pi r^3$

$$2618 = \frac{4}{3} \pi r^3$$

$$\therefore r = \sqrt[3]{\frac{2618 \times 3}{4\pi}}$$

$$= \sqrt[3]{625.001 \dots}$$

$$\therefore \text{radius} = 8.5498 \dots$$

$$\therefore \text{radius} = 8.55 \text{ cm (3 sig. figs.)}$$

c) (i)  $t = 2$

$$P = 25000(1.7)^{0.2 \times 2}$$

$$= 30911.46422$$

$\therefore$  Population is 31000

(nearest 1000 people)

(ii)  $60000 = 25000(1.7)^{0.2t}$

$$2 = (1.7)^{0.2t}$$

try  $t=4$ ,  $(1.7)^{0.2 \times 4} = 1.5$  too low

$t=8$ ,  $(1.7)^{0.2 \times 8} = 2.3$  too high

$t=6$ ,  $(1.7)^{0.2 \times 6} = 1.89$  too low

$t=7$ ,  $(1.7)^{0.2 \times 7} = 2.10$  close

$\therefore$  The population will reach

60000 during the 6<sup>th</sup> year

i.e. 2004.

### Question 26

a)

(i)  $\cos 40^\circ = \frac{250}{BD}$

$$BD = \frac{250}{\cos 40^\circ}$$

$$= 326.3513 \dots$$

$$\therefore BD = 326 \text{ m (nearest m)}$$

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

$$= 326^2 + 110^2 - 2 \times 326 \times 110 \cos 80^\circ$$

$$= 105921.9527$$

$$c = \sqrt{105921.9527}$$

$$= 325.4565 \dots$$

$$\therefore c = 325 \text{ m}$$

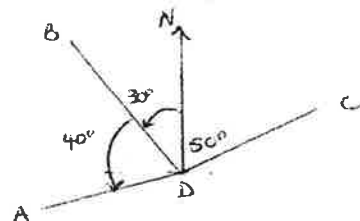
(iii) Area  $\triangle BDC = \frac{1}{2} ab \sin C$

$$= \frac{1}{2} \times 326 \times 110 \sin 80^\circ$$

$$= 17657.6030 \dots$$

$$\therefore \text{Area} = 17658 \text{ m}^2 \text{ (nearest m}^2\text{)}$$

(iv)



Bearings from D:

$$B: 360^\circ - 30^\circ = 330^\circ$$

$$A: 360^\circ - (30^\circ + 40^\circ) = 290^\circ$$

b)

| (i) | 1 | 2 | 3 | 4 | 5 | 6 |
|-----|---|---|---|---|---|---|
| 1   | 0 | 1 | 2 | 3 | 4 | 5 |
| 2   | 1 | 0 | 1 | 2 | 3 | 4 |
| 3   | 2 | 1 | 0 | 1 | 2 | 3 |
| 4   | 3 | 2 | 1 | 0 | 1 | 2 |
| 5   | 4 | 3 | 2 | 1 | 0 | 1 |
| 6   | 5 | 4 | 3 | 2 | 1 | 0 |

(ii) Highest possible score is 5

(iii)  $P(5) = \frac{2}{36}$   
 $= \frac{1}{18}$

(iv) Score that occurred least often is 5

(v)  $P(< 3) = \frac{24}{36}$   
 $= \frac{2}{3}$

### Question 27

a)

(i)

$$11380 = 2380 + \frac{A}{100}(50000 - 20000)$$

$$9000 = 300A$$

$$A = \frac{9000}{300}$$

$$A = 30$$

(ii) Taxable Income =

$$= 53000 + 4200 - 2600$$

$$= \$54600$$

(iii) Tax paid (without medicare)  
levy

$$= \$ (11380 + 0.42(54600 - 50000))$$

$$= \$13312$$

$$\therefore \text{Medicare Levy} = \$ (14131 - 13312)$$

$$= \$819$$

(iv) Sara will receive

$$= (100\% - (42\% + 1.5\%)) \times \$12$$

$$= \$6.78$$

b)  $S = V_0 - Dn$

$$78300 = 15000 - D \times 4$$

$$D = 7169.91 \div 4$$

$$= \$1793.4775$$

$\therefore$  Annual Depreciation is

$$\$1793.48 \text{ (nearest cent)}$$

c)

(i) % correctly detected

$$= \frac{64}{80} \times 100\%$$

$$= 80\%$$

(ii)

Overall accuracy

$$= \frac{64 + 49}{150} \times 100\%$$

$$= \frac{113}{150} \times 100\%$$

$$= 75\frac{1}{3}\%$$

$$(iii) P(\text{not detected}) = \frac{16}{80}$$

$$= 0.2$$

P(will be  
detected 3 bags)

$$= 1 - (0.2)^3$$

$$= 1 - 0.008$$

$$= 0.992$$

$\therefore$  Probability drugs will  
be detected is 0.992

### Question 28

a)

(i) Area =  $s^2$

$$s = 15 - 2x$$

$$\therefore A = (15 - 2x)^2$$

(ii) When  $x = 4$

$$A = (15 - 2 \times 4)^2$$

$$= 7^2$$

$$\therefore \text{Area} = 49 \text{ m}^2$$

(iii) By looking at the

diagram of the land  
with the instant turf,

we see that if  $x = 7.5$ ,  
then the area of the

instant turf is zero.

It makes no sense for  
 $x$  to be greater than  
zero.

(iv) From diagram,

maximum value of  
 $A$  occurs when  
turf covers land  
ie  $15^2$

$$A = (15 - 2x)^2$$

$$= (15 - 2 \times 0)^2$$

$$= 15^2$$

$$\therefore \text{Max. value} = 225$$

$$b) N = M \left\{ \frac{(1+r)^n - 1}{r(1+r)^n} \right\}$$

$$120000 = M \left\{ \frac{(1 + \frac{0.09}{12})^{6 \times 12} - 1}{\frac{0.09}{12}(1 + \frac{0.09}{12})^{6 \times 12}} \right\}$$

$$\therefore M = \$2163.06$$

Graphics

$$n = 12 \times 6$$

$$I = 9 \div 12$$

$$PV = 120000$$

$$PMT = 0$$

$$FV = 0$$

$$P/Y = 1$$

c) (i) 95% = 2 stand. deviation

$$\therefore \text{Diameters} = 8.00 \pm (0.03) \times 2$$

$\therefore$  Between 7.94 and 8.06 cm

$$(ii) 8.00 + 3 \times 0.03 = 8.09$$

Thus, 9cm is more than 3  
st. dev. greater than the  
mean. The operator would  
most probably reject the  
disc.

$$d)(i) C = \$ (P + 0.08x)$$

$$(ii) C = P + 0.08x$$

$$700 = 200 + 0.08x$$

$$500 = 0.08x$$

$$x = 6250$$

$\therefore$  Homer printed 6250 copies