CATHOLIC SECONDARY SCHOOLS
ASSOCIATION OF NEW SOUTH WALES

2002
TRIAL HIGHER SCHOOL CERTIFICATE
EXAMINATION

General Mathematics

Morning Session
Monday 12 August 2002

General Instructions

- Reading time – 5 minutes
- Working time – 2½ hours
- Write using blue or black pen
- Calculators may be used
- Use Multiple Choice Answer Sheet provided
- A separate Formula Sheet is provided

Total marks – 100

| Section I | Pages 2–8 |

Marks (22)
- Attempt Questions 1–22
- Allow about 30 minutes for this section

| Section II | Pages 9–19 |

Marks (78)
- Attempt Questions 23–28
- Allow about 2 hours for this section

2601-1

Section I

Total marks (22)
Attempt questions 1–22
Allow about 30 minutes for this section

Use the Multiple Choice Answer Sheet provided

1   The distance between the Sun and the planet Uranus is 2.87×10^{12} m. What is this distance in kilometres?

(A) 2 870 000 000 000 000 km

(B) 2 870 000 000 000 km

(C) 2 870 000 000 km

(D) 2 870 000 km

2   Using the formula $T = KM - LM^2$ find the value of L when T = 32, K = −4 and M = −2.

(A) − 12

(B) − 6

(C) 6

(D) 12

3   From the diagram, find the area of the shaded region to the nearest square centimetre if each of the circles has a diameter of 6cm.

(A) 31 cm^2

(B) 69 cm^2

(C) 77 cm^2

(D) 89 cm^2
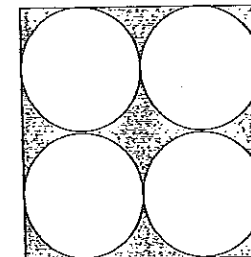
4   At the end of one year an investment is worth $1026. Find the initial amount invested if interest is calculated at 8% p.a. Answer to the nearest dollar.

(A) $82

(B) $128

(C) $950

(D) $1108

5   Sam wishes to survey the students in his school to suggest changes to the Canteen menu. He decides to give the survey to 10% of the students in each year group at the school. What type of sampling is this?

(A) Stratified

(B) Random

(C) Systematic

(D) Census

6   Tina measures the width of a piece of cardboard with a ruler calibrated in millimetres. She measures it to be 36.2 cm. What is the percentage error of her measurement?

(A) $\pm 0.05\%$

(B) $\pm 0.14\%$

(C) $\pm 1.38\%$

(D) $\pm 13.8\%$

7   Two coins are tossed together 20 times. Which calculation below illustrates the expected number of times you would get 2 heads?

(A) $\dfrac{1}{4} \times 20$

(B) $\dfrac{1}{2} \times 20$

(C) $\dfrac{1}{4} \times 40$

(D) $\dfrac{1}{2} \times 40$

8   The depreciation on my new flatscreen television worth $4000 can be found using the declining balance method. The table below shows the value of the television after a number of years.

Years	Salvage value
0	4000
1	3200
2	2560
3	2048
4	1638.4
5	1310.72
6	1048.58
7	838.86
8	671.09
9	536.87
10	429.50

What year will the television be first worth half of its original value?

(A) 2nd

(B) 3rd

(C) 4th

(D) 5th

9   Maria was required to solve an equation for homework. This was her solution.

$$8 - 4(3x - 7) = 16$$
$$8 - 12x + 28 = 16 \quad.............Line\ 1$$
$$-12x - 20 = 16 \quad.............Line\ 2$$
$$-12x = 36 \quad.............Line\ 3$$
$$x = 3 \quad.............Line\ 4$$

Which lines DO NOT follow correctly from the previous line?

(A) Line 1 and Line 2

(B) Line 1 and Line 4

(C) Line 2 and Line 3

(D) Line 2 and Line 4

10   In a One Day Cricket game Brett Lee bowled a ball at a speed of 141.6 km/hr. This speed in m/s is closest to:

(A)   3.9 m/s

(B)   39.3 m/s

(C)   509.8 m/s

(D)   2360 m/s

11   How many 3-digit numbers can be made from the digits 4, 5, 6, and 7 without repetition?

(A)   9

(B)   12

(C)   18

(D)   24

12   The last section of a supermarket docket is shown below. Find the total amount of this bill EXEMPT from GST. Assume GST of 10%.

(A) $35.30

(B) $120.49

(C) $124.02

(D) $155.79
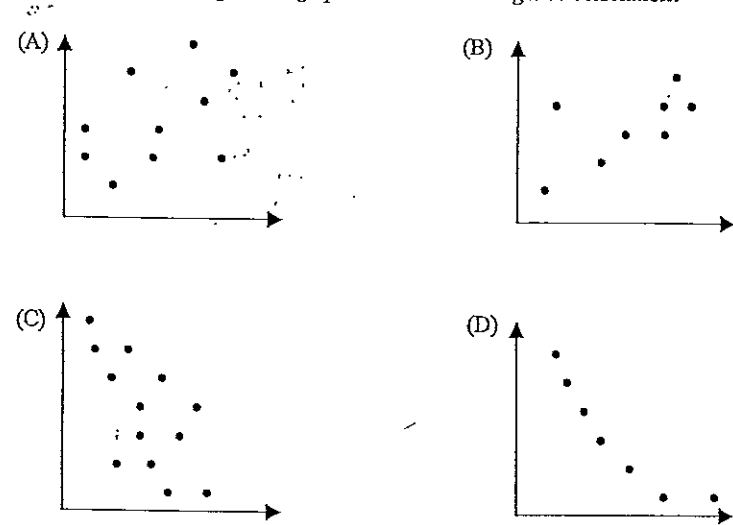
Total	$159.32
E.F.T.	$159.32
CHANGE	0.00
*Taxable items	
TOTAL includes GST	$3.53

13   Keith borrows $2000 for a trip to Hong Kong. He repays the loan over 2 years at an interest rate of 6% p.a compounding monthly.
Keith's monthly instalments are:

(A) $88.41

(B) $93.33

(C) $93.63

(D) $93.93

14   Which of the following scatter graphs shows a weak negative correlation?

15   During the last month in the town of Billabong houses were sold for the following prices:

$160 000	$145 000	$175 000	$200 000
$180 000	$1 250 000	$145 000	$210 000

Which measure gives the best idea of house prices in the area?

(A)   Mean

(B)   Median

(C)   Mode

(D)   Range


16   A Visacard has an annual interest rate of 16%. What would be the equivalent DAILY interest rate to 3 significant figures?

(A)   0.000438%

(B)   0.0438%

(C)   0.044%

(D)   0.160%

17 A survey was taken in a class of 16 students to investigate the number of hours students studied each week. The results, in hours, are as follows:

13, 18, 21, 30, 12, 17, 21, 27, 12, 16, 20, 25, 10, 15, 18, 23.

Which of the following box and whisker plots represents this data?

(A)

(B)

(C)

(D)

```
     |     | | |      |      | | |                    |
    10   13 14 15    18    21 22 23                  30
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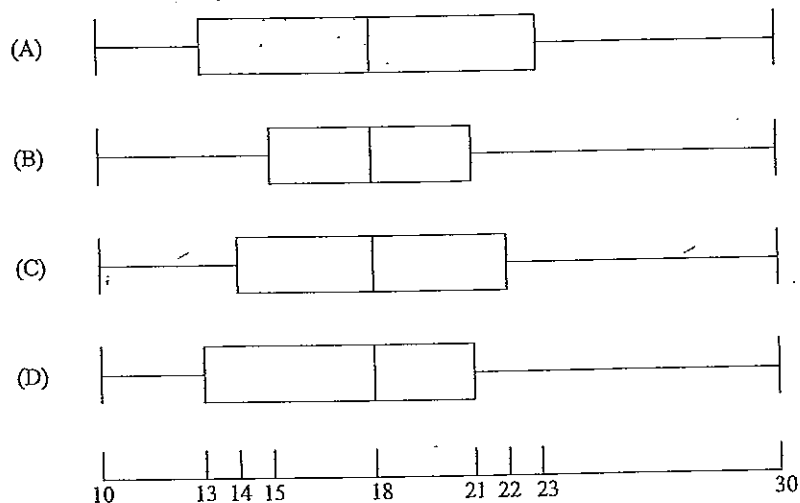
18 In triangle ABC, if $AB = 8$ cm, $BC = 12$ cm and $AC = 15$ cm, then $\angle B$ is:

(A) 5°

(B) 52°

(C) 81°

(D) 95°

19 Maria receives a z-score of 1.6 in an Assessment Task. If the mean of the task was 60 with a standard deviation of 15 what was her raw score?
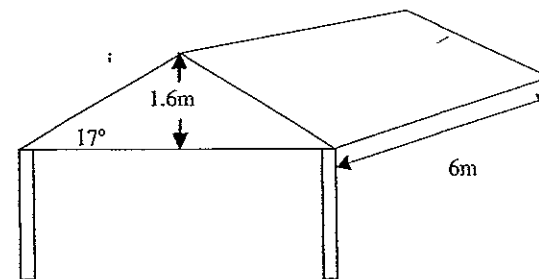
(A) 36

(B) 64

(C) 84

(D) 96

20 A 60 cm pendulum on a clock swings through an angle of 25°. The distance through which the tip of the pendulum moves is closest to:

(A) 15.0 cm

(B) 26.0 cm

(C) 26.2 cm

(D) 377 cm
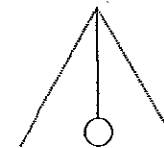
21 The pitch of the roof on a pergola is 17°. The distance from the ceiling to the peak of the roof is 1.6 m. The pergola has a length of 6 m.

The area of the roof is:

(A) 19.2 m²

(B) 32.8 m²

(C) 62.8 m²

(D) 65.7 m²

22 Researchers were testing a new lie detector. The results were as shown in the table below.

	Test results		TOTAL
	Accurate	Not accurate	
People telling the truth	60	8	68
People not telling the truth	140	22	162
TOTAL	200	30	

What percentage of people did the test indicate were not telling the truth?

(A) 13%

(B) 64%

(C) 70%

(D) 87%

Section II

Total marks (78)
Attempt Questions 23–28
Allow about 2 hours for this section

Answer each question in a SEPARATE writing booklet.

Question 23 (13 marks) Use a SEPARATE writing booklet.

(a)   The Hall Family had a Garage Sale one weekend. One member of the family recorded the age and sex of the people who attended. This stem-and-leaf plot shows the results.

GARAGE SALE AGE AND GENDER SURVEY

Males						Stem	Females				
					2	0	4	5	5		
		8	6	4	1	2	5	5	7	
8	7	4	2	2	1	2	1	2	2	4	6
		8	6	4	3	2	4			
				4	3	5	8			

(i)   How many people attended?   1

(ii)   What was the age of the youngest person?   1

(iii)   What was the modal age of the group?   1

(iv)   Indicate which group, males or females, has the greater spread.
Justify your answer with appropriate calculations and/or reasoning.   1

Question 23 (continued)

(b)   A breakfast cereal company decides to make a 525g pack of their cereal. The factory produces packets with a mean weight of 527.5g and a standard deviation of 2.5g.

(i)   For quality control purposes they reject any box containing less than 525g. Under these conditions what percentage of packets produced will be rejected?   1

(ii)   The company also decides to reject packets greater than 3 standard deviations above 525g. What is the maximum weight that will be accepted?   2

(iii)   A packet is selected at random, what is the probability that it weighs greater than 535 g?   1

(c)   A scatterplot is made up of the following points. (See graph labelled – Scatterplot on page 19)

x	1	3	4	5	6	8	10	12	13	14
y	20	15	30	55	40	65	70	85	80	90

(i)   Using the points plotted on page 19 determine the coordinates of the middle median point and mark it on the graph.   2

(ii)   Using a pencil and ruler draw the median regression line on the Scatterplot graph.   1

(iii)   Write the equation of the median regression line.   2

End of Question 23

Question 24 (13 marks) Use a SEPARATE writing booklet.

(a) A family room is 6m × 6.4m.

    (i) Using the scale 1:100 draw a scale diagram of the room.   **1**

    (ii) The floor of the family room is to be tiled using slate tiles which are 40 cm × 40 cm. Calculate the number of tiles required to do this.   **1**

(b) Two hikers Antonio and Melanie leave Holly Wood (H). Antonio walks on a bearing 040° for 12km to reach Zorro Creek (Z). Melanie walks on a bearing of 150° for 8km to reach Amabala (A).
Copy this diagram and clearly indicate all information given.
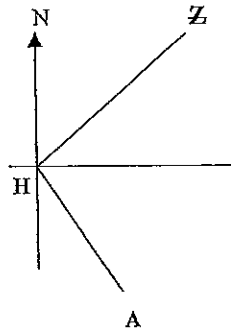
    (i) Show that angle ZHA is 110°.   **1**

    (ii) How far apart are Antonio and Melanie when they are at Zorro Creek and Amabala respectively? Round your answer to two decimal places   **2**

Antonio plans to meet Melanie at Amabala.

    (iii) What is the average speed Antonio will need to run at to reach Melanie at Amabala in 1½ hours?   **1**

    (iv) On what bearing will Antonio run in a straight line from Zorro Creek to Amabala, to the nearest degree?   **2**

(c) An aeroplane is flying from Cairo (30° N, 31° E) to Durban (30° S, 31° E) at a constant speed of 500 knots.

    (i) How many nautical miles will the plane travel in 5 hours?   **1**

    (ii) What are the plane's new coordinates as a result of this 5 hour flight?   **2**

    (iii) Given that the radius of the Earth is 6400 km, calculate, to the nearest kilometre, the great circle distance from Cairo to Durban.   **2**

End of Question 24

11

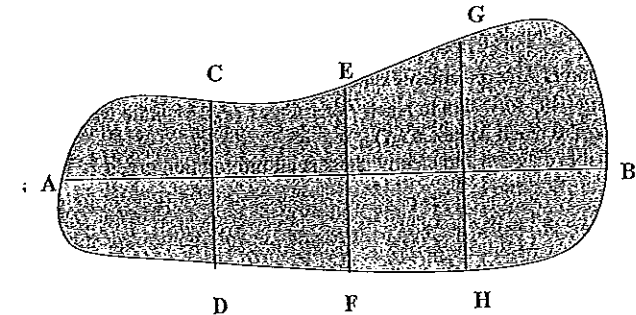**Question 25** (13 marks) Use a SEPARATE writing booklet.

(a) Tim, decided to find the approximate area of the sole of his thong. He made the following measurements with CD, EF, GH placed at regular intervals along AB:
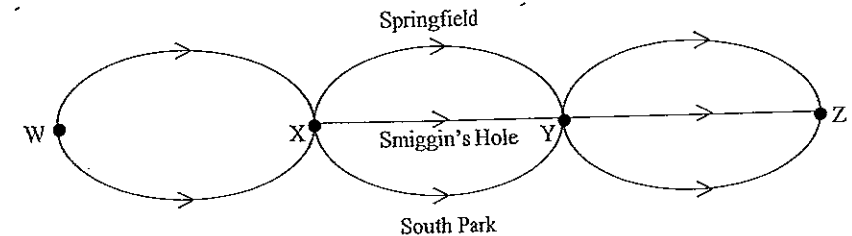
    AB = 28 cm, CD = 9 cm, EF = 8.5 cm and GH = 11.4 cm.

Use Simpson's Rule to calculate the area of the sole of Tim's thong.   **3**

(b) Sven is a speed skater who has to travel from his training venue at W to his home at Z.

Using the diagram below:

    (i) How many different options can Sven take to get home?   **1**

    (ii) Sven chooses his way home at random. Is the probability of Sven going home via Smiggin's Hole greater than going via South Park? Use mathematics to explain your answer.   **2**

12

(c)   When Tai was born his parents put $200 into his piggy bank, on each following birthday they placed $150 into it.

   (i)   Write an algebraic expression relating the total amount A in the piggy bank to the time t in years.   2

   (ii) Which of the variables A or t is the independent variable in this equation? Explain your answer.   1

(d)   A bag contains 7 red counters R and 4 green counters G. Two counters are randomly selected from the bag.

   (i)   Copy the tree diagram into your writing booklet and complete the diagram by writing the probabilities on all the branches.   2
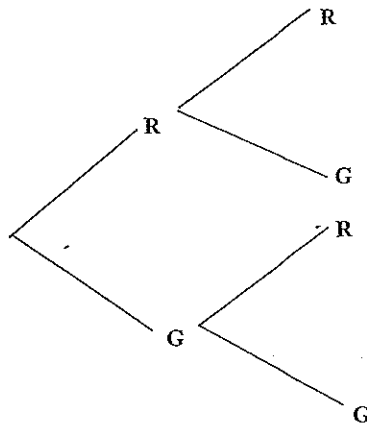
   (ii) What is the probability that:

      1   both are red ?   1

      2   one of each colour is selected?   1

End of Question 25

(a)   Chris is saving for an overseas holiday, costing $15 000. He has already saved $10000. His saving plan is listed below:

   Investment 1:   a term deposit using his $10 000 already saved, at 0.75% per month, compounding monthly.

   Investment 2:   a deposit of $150 per month, paid at the end of the month, invested at 6%p.a., compounding monthly.

The table below shows the value of each investment and also the total value of his investments for the first 12 months.

Months	Accumulated Value of		
	$10000 Term deposit	$150 Monthly Savings	Total savings
1	10075	150	10225
2	10150.56	300.75	10451.31
3	10226.69	452.25	10678.94
4	**A**	**B**	**C**
5	10380.67	757.54	11138.21
6	10458.52	911.33	11369.85
7	10536.96	1065.88	11602.84
8	10615.99	1221.21	11837.20
9	10695.61	1377.32	12072.93
10	10775.83	1534.20	12310.03
11	10856.64	1691.87	12548.51
12	10938.07	1850.33	12788.40

   (i)   Find the missing amounts at A, B and C.   3

   (ii) At the end of 12 months, how much interest has Chris earned   2

Question 26 (continued)

(iii) Chris would like to know when he will have enough money to afford the holiday. He writes down the following:

$$\text{Amount} = 10000(1+0.0075)^n + \frac{150\{(1+0.005)^n - 1\}}{0.005}$$

Explain why this formula will calculate his total savings at time n. Clearly indicating the purpose of each significant number or pronumeral. **3**

(iv) Chris would like to take his holiday at the end of 2 years. Will he have accumulated $15000? Justify your answer with appropriate calculations and/or reasoning. **2**

(b) Penelope leases a PT Cruiser for $42000. The car will depreciate by 10% per year. Penelope can calculate the value of her car using either the Straight-Line Formula or Declining Balance Formula for depreciation.
At the end of the 4 year lease period she intends to purchase the car. Using the two (2) methods of depreciation, calculate the car's worth at the end of four years and explain under which method would Penelope receive the better deal. **3**
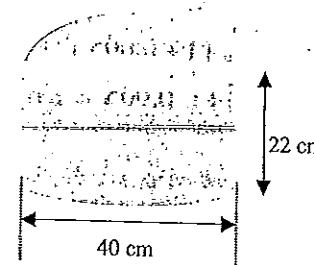
End of Question 26

Question 27 (13 marks) Use a SEPARATE writing booklet.

(a) Tony is creating an 18th birthday cake. Its lower section is a cylinder with a hemisphere on top as illustrated in the diagram.

22 cm

40 cm

(i) Tony wants to ice the entire cake, excluding the base, with melted white chocolate. Calculate the area of the surface to be iced. Answer correct to 2 decimal places. **2**

(ii) Tony is to ice the cake to a uniform thickness of 5 mm. Calculate the final volume of the cake including the icing. **2**

(b) Grant takes out a home loan of $100000 at 10%p.a. Interest I is calculated monthly and Grant will make a repayment R of $1300 each month.
He draws up a table showing the progress he makes in repaying the loan over the first 6 months.

Months	Principal(P)	Interest(I)	P+I	P+I-R
0	100000	833.33	100833.33	99533.33
1	99533.33	829.44	100362.78	99062.78
2	99062.78	825.52	99888.30	98588.30
3	98588.30	821.57	99409.87	98109.87
4	A	B	C	D
5	97627.45	813.56	98441.01	97141.01
6	97141.01	809.51	97950.52	96650.52

(i) Calculate the values of A, B, C and D. **4**

(ii) How much has Grant paid off the principal P of the loan at the end of 6 months? **1**

(c) The equation for the area of an annulus is

$$A = \pi(R^2 - r^2)$$

Where R is the radius of the outer circle and r the radius of the inner circle

(i) Rewrite the equation with r as the subject. **2**

(ii) A concrete pipe, has an area of 216 cm² and a outer radius of 15cm. Calculate the inner radius of the pipe. **2**

End of Question 27

Question 28 (13 marks) Use a SEPARATE writing booklet.

(a) The number of tables that can be set in a restaurant is inversely proportional to the distance between the tables. When tables are placed 1.2 metres apart 40 tables can be set.

    (i) Write an equation relating the number of tables (n) and their distance (d) apart.   1

    (ii) Calculate how many tables can be set when the distance between tables is reduced to 800 mm.   1

(b) James makes wooden rocking horses as part of his business. To calculate the cost (C) of making each rocking horse he uses the model $C = \dfrac{k}{n+1}$

where (n) is the number of rocking horses.

The table below indicates James' production costs per horse for varying numbers of horses produced.

n	2	5	7	11
C	80	40	30	20

    (i) Find the value of k in his production equation.   1

    (ii) Calculate his initial costs.   1

    (iii) James sells the rocking horses for $50 each. How many horses will he need to sell before he begins to make a profit?   2

    (iv) James makes and sells 14 horses calculate his total profit?   2

    (v) Why would it be unwise for James to rely on this formula when producing large numbers of rocking horses.
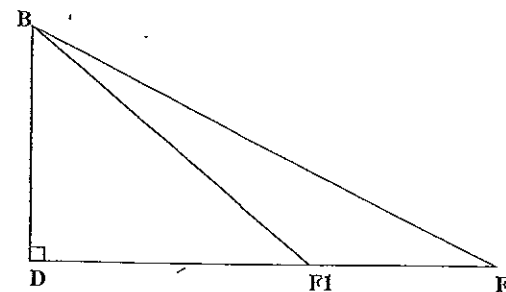Justify your answer with appropriate mathematics.   2

Question 28 (continued)

(c) Bob the Builder is climbing the Sydney Harbour Bridge. When he is 72 metres above water level he notices two ferries F1 and F2 in line. From his position the angle of depression of F1 is 23° while the angle of depression to F2 is 12°.

    (i) Copy the diagram into your booklet clearly showing all given information   1

    (ii) Find the distance between the ferries F1 and F2, to the nearest metre.   2

End of Paper
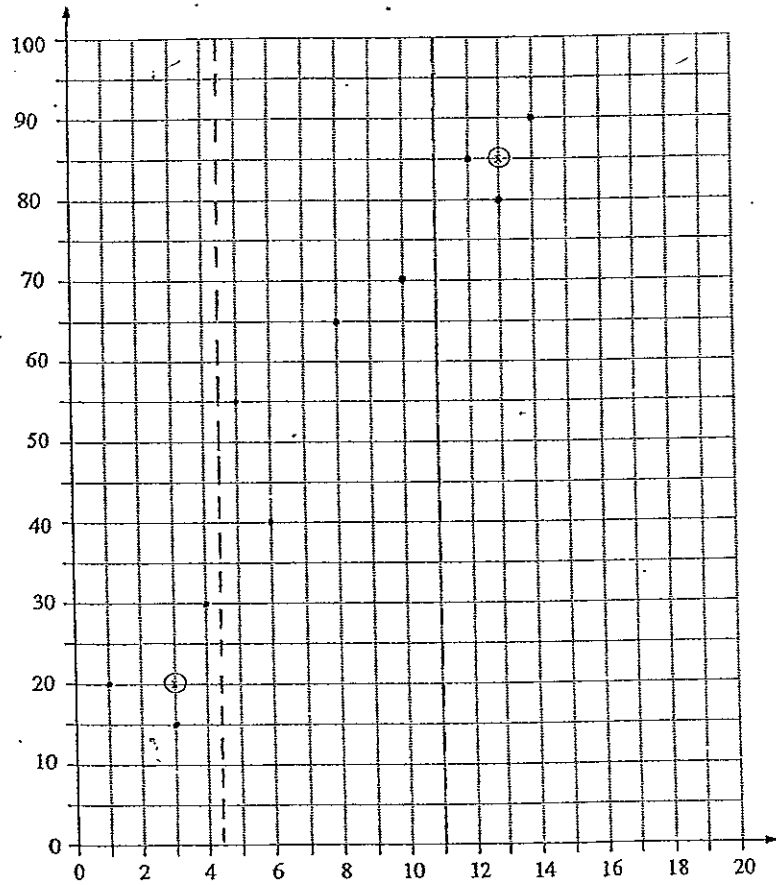
2002 TRIAL HIGHER SCHOOL CERTIFICATE
GENERAL MATHEMATICS

This page is to be detached, completed and attached to the inside front cover of your writing booklet for Question 23.

Question 23(a)(i) and (ii)

Scatterplot

Ⓧ Median Point

CATHOLIC SECONDARY SCHOOLS ASSOCIATION

2002 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

GENERAL MATHEMATICS MARKING GUIDELINES / SOLUTIONS

Section A – Multiple Choice – Questions 1-22   1 Mark Each

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

Section B

{ IU = Ignore Units, (brackets) = details within brackets not necessary for marks}

Outcomes Assessed: H1, H2; Syllabus Content: DA5
Targeted Performance Bands: 2-3

Question	Criteria	Marks
23(a)(i)	Correct answer = 30 (people) IU	1
(ii)	Correct answer = 2 (years) IU	1
(iii)	Correct answer = 22 (years) IU	1

Outcomes Assessed: H1, H2, H4; Syllabus Content: DA5
Targeted Performance Bands: 3-5

Question	Criteria	Marks
23(a)(iv)	Females have a greater spread. |	Males	Females
---	---	---
IQR	31-17=14	33-13.5=19.5
SD	9.8	13.7
Range	36	44 | Correct comparison of any one of these OR indicate the difference in distribution. Note: No mark is awarded for male/ female choice.	1

Outcomes Assessed: H2, H4; Syllabus Content: DA6
Targeted Performance Bands: 3-5

Question	Criteria	Marks
23(b)(i)	Correct answer = 16%	1
(ii)	3 standard deviations above 525g is 2 standard deviations above the mean. $527.5 + 2x \, 2.5 = 532.5g$. Correct answer: Reject above 532.5g	2
	• $527.5 + 3 \times 2.5 = 535g$ OR • $3 \times 2.5 = 7.5g$	1

2601-2

Outcomes Assessed: H2, H4; Syllabus Content: DA6
Targeted Performance Bands: 3-5

Question	Criteria	Marks
23(b)(iii)	3 standard deviations $= 99.7\%$. ∴ Above 3 standard deviations from mean $= \dfrac{0.3\%}{2} = 0.15\%$ Correct answer $= \dfrac{0.15}{100} = \dfrac{3}{2000}$	1

Outcomes Assessed: H1, H2, H4, P5; Syllabus Content: DA7, AM2
Targeted Performance Bands: 2-3

Question	Criteria	Marks
23(c)(i)	• Calculates correct coordinates (7, 60) • Correctly plots (7,60) On graph	2
	Any one of the following: • Calculates one median correctly (either 7 OR 60) • Correctly plots their wrong point on the graph	1

Outcomes Assessed: H2, H4, P5; Syllabus Content: DA7, AM2
Targeted Performance Bands: 2-3

Question	Criteria	Marks
23(c)(ii)	A line drawn through the two end median points and then moved 1/3 towards the middle median point	1

Outcomes Assessed: H2, H4, P5; Syllabus Content: DA7, AM2
Targeted Performance Bands: 3-4

Question	Criteria	Marks
23(c)(iii)	$y = 6.5x + 5.16$ • Correctly calculates gradient of 6.5 or correct from their (ii) • Correctly calculates y-intercept of 5.16 (accept 5 ± 0.5) or correct from their (ii)	2
	Either one of the above	1

Outcomes Assessed: P2, P6, P7; Syllabus Content: M3
Targeted Performance Bands: 2-4

Question	Criteria	Marks
24(a)(i)	Draws rectangle 60mm x 64mm	1

Outcomes Assessed: P2, P6, P7; Syllabus Content: M3
Targeted Performance Bands: 2-3

Question	Criteria		Marks
24(a)(ii)	Correctly calculates 240 (tiles)	$A = 6 \times 6.4$ $= 38.4m^2$ No. tiles $= \dfrac{38.4}{0.16}$ $= 240$	1

Question	Criteria	Marks
24(b)(i)	Angle ACZ $= 150^0 + 40^0 = 110^0$	1
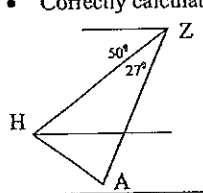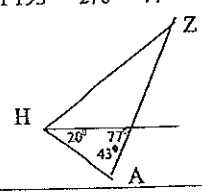
Outcomes Assessed: H6, H7, H11; Syllabus Content: M6
Targeted Performance Bands: 2-4

Question	Criteria		Marks
24(b)(ii)	Correctly calculates 16.54 (km)	$AZ^2 = 12^2 + 8^2 - 2 \times 12 \times 8\cos110^0$ $= 273.6678$ $AZ \approx 16.54km$	2
	One of the following • Correctly calculates $AZ^2 = 273.667...$ • Correctly substitutes into Cosine Rule		1

Outcomes Assessed: P2; Syllabus Content: M1
Targeted Performance Bands: 2-3

Question	Criteria		Marks
24(b)(iii)	Speed = 11.03 km/hr	Speed $= \dfrac{D}{T} = \dfrac{16.5429..}{1.5}$ $= 11.028606....$ kph	1

Outcomes Assessed: H1, H2, H6, H7; Syllabus Content: M6
Targeted Performance Bands: 5-6

Question	Criteria	Marks
24(b)(iv)	• Correctly calculates , using Sine Rule, angle $AZH = 27^0$ or angle $HAZ = 43^0$ • Correctly calculates bearing of $193^0 = 270^0 - 77^0$	2
	One of: • Correctly calculates angle $AZH = 27^0$ • Calculates bearing correctly with their incorrect angle calculated earlier.	1

Outcomes Assessed: H2, H7; Syllabus Content: M7
Targeted Performance Bands: 2-3

Question	Criteria		Marks
24(c)(i)	Correct answer of 2500M IU	Distance $= S \times T$ $= 500 \times 5$ $= 2500M$	1

Question	Criteria		Marks
24(c)(ii)	($11^0 40'$ S, 31^0E) ...Both correct.	Angular Distance $= \dfrac{2500}{60}$ $= 41^0 40'$	2
	One of: • $11^0 40'$ S • 31^0 E		2

Outcomes Assessed: H2, H6, H7; Syllabus Content: M7
Targeted Performance Bands: 2-3

Question	Criteria		Marks
24(c)(iii)	• Correct angular distance • Correct answer of 6 702 (km)	Angle $= 30^0 + 30^0$ $= 60^0$ $l = \dfrac{60}{360} \times 2\pi(6400)$ $= 6702.064320$ $\approx 6702km$	2
	One of: • Correct angular distance • Correct answer from incorrect substitution into correct formula		1

Outcomes Assessed: H1, H2, H6; Syllabus Content: M5
Targeted Performance Bands: 2-3

Question	Criteria	Marks
25(a)	$A = \dfrac{h}{3}\left[d_f + d_l + 4d_m\right]$ $= \dfrac{7}{3}[0 + 8.5 + 4 \times 9] + \dfrac{7}{3}[8.5 + 0 + 4 \times 11.4]$ $= 230.0666$ $\approx 230cm^2$	3
	One mark for each of the following: • $h = 7$ • end pt(s) = 0 • Correct substitution with their h	1

Outcomes Assessed: H3, H4, H10; Syllabus Content: PB3
Targeted Performance Bands: 3-5

Question	Criteria		Marks
25(b)(i)	Correct answer of 18 (routes)	No. of combinations $= 2 \times 3 \times 3 = 18$	1

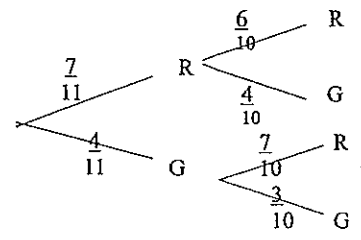| Question	Criteria	Marks
25(b)(ii)	P(Smiggins Hole) = 1/3, P(South Park) = 1/3. Therefore answer is NO...probabilities are the same.	1
	• Correct probability calculated for each route • Statement /conclusion using mathematics to support answer	2
	• Correct calculation of probabilities with no conclusion (NOTE: A conclusion with no maths is awarded no marks)	1

Outcomes Assessed: P1, P3, P4; Syllabus Content: AM1
Targeted Performance Bands: 3-4

Question	Criteria	Marks
25(c)(i)	$A = 200 + 150t$ 1 Mark for each: • 200 (y-intercept) • 150t	2

Outcomes Assessed: P1, P4; Syllabus Content: AM2
Targeted Performance Bands: 3-4

Question	Criteria	Marks
25(c)(ii)	't' because it is not affected by A (Mark only given for explanation not choice)	1

Outcomes Assessed: P1, P9; Syllabus Content: DA2
Targeted Performance Bands: 3-5

Question	Criteria	Marks
25(d)(i)	Correct probabilities for both selections 	2
	One of: • Correct probability for 1st selection • Correct probabilities for 2nd Selection (can be based on incorrect 1st selection probabilities)	1

Question	Criteria	Marks
25(d)(ii) 1	Correct answer of $\frac{21}{55}$ or $\frac{42}{110}$ $P(RR) = \frac{7}{11} \times \frac{6}{10} = \frac{21}{55}$	1

Outcomes Assessed: H2, H4, H10; Syllabus Content: PB3
Targeted Performance Bands: 3-5

Question	Criteria	Marks
25(d)(ii) 2	Correct answer of $\frac{28}{55}$ or $\frac{56}{110}$ $P(\text{one of each}) = P(RG) + P(GR)$ $= \frac{7}{11} \times \frac{4}{10} + \frac{4}{11} \times \frac{7}{10}$ $= \frac{56}{110}$ $= \frac{28}{55}$	1

Outcomes Assessed: H1, H2, H5, H8; Syllabus Content: FM5
Targeted Performance Bands: 3-5

Question	Criteria	Marks
26(a)(i)	• One mark for each correct entry for A, B and C $A = 10\,000(1+0.0075)^4$ $= 10\,303.39$ $B = 150\left\{\dfrac{(1+0.005)^4 - 1}{0.005}\right\}$ $= 604.52$ $C = 10\,303.39 + 604.52$ $= 10\,907.91$	3

Outcomes Assessed: H1, H2, H5, H8; Syllabus Content: FM5
Targeted Performance Bands: 4-5

Question	Criteria	Marks
26(a)(ii)	• Correct calculation of 988.40 $\text{Interest} = 12788.40 - (10000 + 12 \times 150)$ $= 988.40$	2
	• Calculation of principal of $10000 + ($150 \times 12)$	1

Question	Criteria	Marks
26(a)(iii)	• Stating $10000(1+0.00075)^n$ is compound interest formula where $10000 is principal and 0.0075 is interest for that period, n is period. • Stating $150\dfrac{((1+0.005)^n-1)}{0.005}$ is the future value of investing 150 / month at 6% p.a. (0.005% per month) and n is number of months. • The addition of the above because he has both investments going at same time.	3
	One mark for each of the following • Noting 0.005 is 6% p.a. converted to monthly. • Relating compound interest to $10000(1+0.00075)^n$ • Relating future value to $150\dfrac{((1+0.005)^n-1)}{0.005}$	1

Outcomes Assessed: H1, H2, H5, H8, H11; Syllabus Content: FM5
Targeted Performance Bands: 4-5

Question	Criteria	Marks
26(a)(iv)	• Correct answer of $15,778.93 (or $15,779) and • Conclusion saying he would reach $15000 for holiday (an excess of $778.93) $A = 10000(1.0045)^{24} +$ $150\left\{\dfrac{(1.005)^{24}-1}{0.005}\right\}$ $=15778.93$	2
	One of the following • Calculation of $15778.93 ($15779) with no or wrong conclusion • Correct conclusion from incorrect calculation	1

Question	Criteria	Marks
26(b)	• Straight line – value = 25200 • Declining Balance – value = 27556.20 • Therefore better to use straight line method because the value is less $S = V_0(1-r)^n$ $=42000(1-0.10)^4$ $=27556.20$ $S = V_0 - Dn$ $=42000-4\times4200$ $=25200$	3
	Any one of (1 mark each) • Straight line value = 25 200 • Declining balance value = $27 556.20 • Correct conclusion from incorrect calculations	1

Outcomes Assessed: H2, H3, H6, H7, H11; Syllabus Content: M5
Targeted Performance Bands: 4-5

Question	Criteria	Marks
27(a)(i)	$SA_{cyl} = 2\pi rh$ $= 2\pi(20).22$ $= 2764.601535$ $SA_{hem} = \dfrac{\frac{1}{2}4\pi r^2}{}$ $= \dfrac{\frac{1}{2}4\pi(20)^2}{}$ $= 2513.274123$ $SA_{total} = 5277.875658$ $\approx 5277.88 cm^2$	2
		1
	1 Mark for • Correct calculation of SA of cylinder • Correct calculation of SA of hemisphere	

Question	Criteria	Marks
27(a)(ii)	New radius = 20.5, Height = 22 $\therefore V_{cyl} = \pi r^2 h$ $= \pi (20.5)^2 \cdot 22$ $= 29045.59480$ Total = 47089.07041 $\approx 47089 cm^3$ $\therefore V_{hem} = \frac{1}{2}\cdot\frac{4}{3}\pi r^3$ $= 18043.4756\,1$	2
	1 Mark each for: • Correct calculation of V of hemisphere • Correct calculation of V of cylinder	1

Outcomes Assessed: P2, P8; Syllabus Content: FM2
Targeted Performance Bands: 2-4

Question	Criteria	Marks
27(b)(i)	One mark for each of the following: A= 98109.87 B= 817.58 C= 98927.45 D= 97627.45	4

Outcomes Assessed: P2, P8; Syllabus Content: FM2
Targeted Performance Bands: 3-4

Question	Criteria	Marks
27(b)(ii)	Correct calculation of $3349.48 paid off (100 000 − 96650.52)	1

Outcomes Assessed: H2, H3 Syllabus Content: AM3
Targeted Performance Bands: 3-4

Question	Criteria	Marks
27(c)(i)	$A = \pi(R^2 - r^2)$ $\frac{A}{\pi} = R^2 - r^2$ $r^2 = R^2 - \frac{A}{\pi}$ $r = \sqrt{R^2 - \frac{A}{\pi}}$	2
	One mark for • Obtains correct eqn for r^2 or • Dividing both sides by π	1

Question	Criteria	Marks
27(c)(ii)	$r^2 = \sqrt{R^2 - \frac{A}{\pi}}$ $= \sqrt{15^2 - \frac{216}{\pi}}$ $= 12.49980258$ r =12.5cm OR correct substitution into their formula.	2

Outcomes Assessed: H2, H3; Syllabus Content: AM4
Targeted Performance Bands: 3-4

Question	Criteria	Marks
28(a)(i)	$n \propto \frac{1}{d}$ $\therefore n = \frac{k}{d}$ 1 Mark for correct equation	1

Outcomes Assessed: H3, H5, H11; Syllabus Content: AM4
Targeted Performance Bands: 3-4

Question	Criteria	Marks
28(a)(ii)	Find k when n=40 and d=1.2 $k = n \times d$ $k = 48$ $\therefore n = \frac{48}{d}$ $= \frac{48}{0.8}$ n = 60 Tables NOTE: d = 800mm = 0.8m • 1 Mark for calculating k based on their equation from (i) AND calculating n when d = 800mm	1

Outcomes Assessed: H2; Syllabus Content: AM3
Targeted Performance Bands: 2-3

Question	Criteria	Marks
28(b)(i)	Correct substitution and evaluation leading to k = 240	1
(ii)	Correct calculation when n = 0, C = $240	1

Question	Criteria	Marks
28(b)(iii)	Correct calculation to get $n = 4$ (or CFPA)	2
	1 mark for equating $50 = \dfrac{240}{n+1}$	1
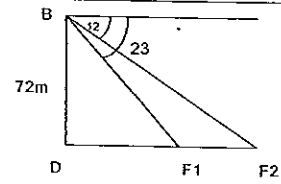
Outcomes Assessed: P4; Syllabus Content: AM4
Targeted Performance Bands: 3-4

Question	Criteria	Marks
28(b)(iv)	Cost / horse to make $= \dfrac{240}{15}$ $= \$16$ Selling $= \$50$ Profit / horse $= \$34$ Therefore, total profit $= 34 \times 14 = \$476$	2
	1 mark for each of • Correctly calculate profit / horse of $34 • Correctly multiplying their profit with 14	1

Outcomes Assessed: H5, H11; Syllabus Content: AM4
Targeted Performance Bands: 3-4

Question	Criteria	Marks
28(b)(v)	• Correct mathematics leading to a conclusion of large n produces unrealistic values for C.	2
	One mark for any one of the following: • Correct conclusion from incorrect mathematics • Correct mathematics with no conclusion	1

Outcomes Assessed: H6; Syllabus Content: M6
Targeted Performance Bands: 3-4

Question	Criteria	Marks
28(c)(i)	 • Correctly shows at least one angle and 72m	1

Question	Criteria	Marks
28(c)(ii)	Correctly calculates distance F1 – F2 as 169m	2
	1 Mark for any of the following: • DF1: $\tan 67 = \dfrac{x}{72}$ $x = 72\tan 67$ $= 169.6213703$ • DF2: $\tan 78 = \dfrac{x}{12}$ $x = 72\tan 78$ $= 338.7333679$ $F1F2 = 169.1119976$	1