



**CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW
2013 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
GENERAL MATHEMATICS**

Section I
10 marks

Questions 1-25 (1 mark each)

Question	Answer	Content	Syllabus Assessed	Targeted Performance Bands
1	A	AM1: Basic algebraic skills	P2, P5	2-3
2	C	FM1: Earning money	P2	2-3
3	D	DA6: The normal distribution	H9, H11	3-4
4	D	DA5: Interpreting sets of data	H4, H5	3-4
5	D	FM5: Annuities and loan repayments	H2	3-4
6	C	FM1: Earning Money	P2	3-4
7	D	M5: Further applications of area and volume	H2	3-4
8	C	AM3: Algebraic skills and techniques	H3	3-4
9	A	DA6: The normal distribution	H4, H9	3-4
10	C	FM2: Investing Money	P2	3-4
11	C	DA3: Displaying data sets	P4	3-4
12	A	M6: Applications of trigonometry	H11	3-4
13	B	AM4: Modeling linear and non-linear relationships	H5	3-4
14	A	M1: Units of Measurement	P7	3-4
15	B	FM6: Depreciation	H8	4-5
16	D	DA7: Correlation	H4	3-4
17	D	FM4: Credit and Borrowing	H2	4-5
18	B	DA2: Data collection and sampling	P11	4-5
19	D	PB1: The language of chance	P10	4-5
20	A	AM3: Algebraic skills and techniques	H2	4-5
21	B	M5: Further applications of area and volume	H2	4-5
22	B	M6: Applications of trigonometry	H6	4-5
23	B	PB3: Multi-stage events	H10	4-5
24	A	M7: Spherical geometry	H2	4-5
25	C	PB2: Relative frequency and probability	P10	5-6

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Section II

Question 26

(a) (1 mark)

Content: FM1: Earning Money

Outcomes assessed: P2

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$0.025 \times 42\,600 = \$1065$	1 mark for correct answer	1

(b) (1 mark)

Content: AM1: Basic Algebraic Skills

Outcomes assessed: P2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\frac{22a}{3}$	1 mark for correct answer	1

(c)(i) (1 mark)

Content: PB2: Relative frequency and probability

Outcomes assessed: P10

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Relative frequency of yellow = $\frac{10}{120} = \frac{1}{12}$	1 mark for correct answer (regardless of simplification)	1

(c)(ii) (1 mark)

Content: PB2: Relative frequency and probability

Outcomes assessed: P11

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
In an unbiased situation it is expected that particular colour would be spun 20 times Because the yellow section is only spun 10 times the experiment may be biased. It may be that the yellow section is smaller than the other numbers	1 mark for answer that includes mention of expectation	1

(d)(i) (1 mark)

Content: DA5: Interpreting sets of data

Outcomes assessed: H4

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Port Macquarie	1 mark for correct answer	1

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(d) (ii) (1 mark)

Content: DA5: Interpreting sets of data

Outcomes assessed: H4

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
2010	1 mark for correct answer	1

(d)(iii) (1 mark)

Content: DA5: Interpreting sets of data

Outcomes assessed: H11

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Rainfall is fairly consistent over the years	1 mark for a correct statement	1

(e) (2 marks)

Content: PB4: Applications of probability

Outcomes assessed: H4, H10

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Financial expectation = $0.35 \times 50\,000 - 0.65 \times 25\,000$ = \$1250	2 marks for correct answer that includes financial expectation/gain and statement that is backed mathematically	2
Financial gain = $1250 - 1500 = -\$250$	1 mark for calculating financial expectation	
I would not recommend investing in the mine as there will be a loss	or correct mathematical statement from incorrect gain	

(f) (2 marks)

Content: M1: Units of Measurement, AM3: Algebraic skills and techniques

Outcomes assessed: P2, H7

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$44 \times 9.4605 \times 10^{15} \div 1000$ = 4.16×10^{14} km	2 marks for correct answer with 3 sig. fig. and scientific notation	2
	1 mark for answer in metres	

(g) (1 mark)

Content: DA2: Data collection and sampling

Outcomes assessed: P9

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$x = \frac{250 \times 30}{2} = 3750$	1 mark for correct answer	1

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(h) (i) (1 mark)

Content: FM3: Taxation

Outcomes assessed: P2, P8

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Approx. \$26 000	1 mark for correct answer	1

(h) (ii) (1 mark)

Content: FM3: Taxation

Outcomes assessed: P2, P8

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
\$10 000	1 mark for correct answer	1

(h) (iii) (1 mark)

Content: FM3: Taxation

Outcomes assessed: P2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\frac{24000}{40000} = 0.6$	1 mark for correct answer	1

Question 27

(a) (i) (1 mark)

Content: FM6: Depreciation

Outcomes assessed: H5

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
\$12 000	1 mark for correct answer	1

(a) (ii) (1 mark)

Content: FM6: Depreciation

Outcomes assessed: H5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
17%	1 mark for correct answer	1

(a) (iii) (2 marks)

Content: FM6: Depreciation

Outcomes assessed: H2, H5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
At 3 years: $S = \$6861.44$ After 4 years $S = 6861.44(1 - 0.2)$ $= \$5489.15$	2 marks for correct value after 4 years 1 mark for correct salvage value after 3 years	2

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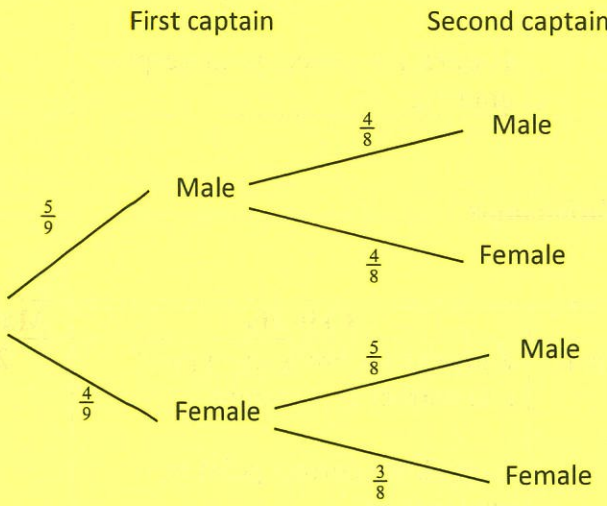
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(b) (i) (2 marks)

Content: PB3: Multi-stage events

Outcomes assessed: H10

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
First captain Second captain  <pre> graph LR A[] --- 5/9 B[Male] A --- 4/9 C[Female] B --- 4/8 D[Male] B --- 4/8 E[Female] C --- 5/8 F[Male] C --- 3/8 G[Female] </pre>	2 marks for correct answer 1 mark for 2 correct probabilities	2

(b) (ii) (2 marks)

Content: PB3: Multi-stage events

Outcomes assessed: H10

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Calculating the probability of one or two women captains (FF, FM, MF) $\text{Probability} = \frac{4}{9} \times \frac{3}{8} + \frac{4}{9} \times \frac{5}{8} + \frac{5}{9} \times \frac{4}{8}$ $= \frac{13}{18}$ or using complementary events $1 - P(MM) = 1 - \frac{5}{9} \times \frac{4}{8} = \frac{13}{18}$	2 marks for correct answer 1 mark for including multiplication/addition principle for 2 outcomes OR showing knowledge of complementary events	2

(b) (iii) (2 marks)

Content: PB3: Multi-stage events PB1: The language of chance

Outcomes assessed: H10, P11

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Probability of being selected = $\frac{2}{9}$. So Grant has a small chance of being selected	2 marks for correct answer 1 mark for an answer that includes correct probability	2

(c) (i) (2 marks)

Content: AM2

Outcomes assessed: H3

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$C = 0.5n + 150$	2 marks for correct equation 1 mark for correct y-intercept or gradient	2

(c) (ii) (2 marks)

Content: AM4: Modeling Linear and Non-linear relationships

Outcomes assessed: H2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
The break-even point is the point where the cost is equal to the income, hence the total profit is zero If less than 20 cars are washed a loss is made if more than 20 cars are washed a profit is made Point is (20, 160)	2 marks for break-even point and correct explanation 1 mark for correct point or explanation	2

(c) (iii) (1 mark)

Content: AM4: Modeling Linear and Non-linear relationships

Outcomes assessed: H2

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$400 - 175 = \$225$	1 mark for correct answer	1

Question 28

(a) (3 marks)

Content: M5: Further applications of area and volume

Outcomes assessed: H6

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$V = \frac{1}{2} \times \pi \times 0.25^2 \times 2$ 0.1963495 m^3 Hay : $200 \times 0.5 = 100 \text{ m}^3$ Therefore $100 \div 0.1963495 = 509.29$ 509 troughs	3 marks for correct answer 2 marks for trough and hay bale calculation or using one incorrect answer to correctly find no. of troughs 1 mark for calculation of volume of trough or hay bale volume	3

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(b) (i) (1 mark)

Content: M6: Applications of trigonometry

Outcomes assessed: H6

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$(360-342) + 63 = 81$	1 mark for showing answer	1

(b) (ii) (2 marks)

Content: M6: Applications of trigonometry

Outcomes assessed: H6

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$7.6 = \frac{1}{2} \times 4.3 \times x \times \sin 81$	2 marks for correct calculation of x	2
$x = 3.6 \text{ m}^2$	1 mark for correct substitution	

(b) (iii) (2 marks)

Content: M6: Applications of trigonometry

Outcomes assessed: H6

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$c^2 = 2.5^2 + 2.2^2 - 2 \times 2.5 \times 2.2 \times \cos 142$	2 marks for correct answer No penalty for rounding	2
$c = 4.445010494$	1 mark for progress towards answer	
$c = 4.4 \text{ km}$		

(c) (1 mark)

Content: AM1: Basic algebraic skills

Outcomes assessed: P2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$200 \div 107 \times 7 = \13.08	1 mark for correct answer	1

(d) (2 marks)

Content: AM3: Algebraic skills and techniques

Outcomes assessed: H2

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$\sqrt{18-x} = 2$	2 marks for correct answer	2
$18-x = 4$	1 mark for progress towards answer	
$x = 14$		

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(e) (i) (2 marks)

Content: AM4: Modeling linear and non-linear relationships

Outcomes assessed: H3

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$T = \frac{k}{r^2}$ $32 = \frac{k}{10^2}$ $k = 3200$	2 marks for correct answer 1 mark for progress towards the answer	2

(e) (ii) (2 marks)

Content: AM4: Modeling linear and non-linear relationships

Outcomes assessed: H5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$T = \frac{3200}{r^2}$ $20 = \frac{3200}{r^2}$ $r = 12.7$	2 marks for correct answer 1 mark for progress towards answer	2

Question 29

(a) (i) (1 mark)

Content: DA4: Summary Statistics

Outcomes assessed: P7

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$\bar{x} = \frac{353}{15} = 23.5$	1 mark for correct answer	1

(a) (ii) (2 marks)

Content: DA4: Summary Statistics

Outcomes assessed: P7

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Median beginning of camp = 24	2 marks for both correct	2
Median end of camp = 40	1 mark for one correct median	

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(a) (iii) (1 mark)

Content: DA4: Summary Statistics

Outcomes assessed: P7

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
- Broken arm/injury/sick - Not taking it seriously OR any other reasonable answer	1 mark for one correct reason	1

(a) (iv) (1 mark)

Content: DA5: Interpreting sets of data

Outcomes assessed: H11

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
The outlier will increase the standard deviation	1 mark for correct explanation	1

(a) (v) (2 marks)

Content: DA4: Summary Statistics

Outcomes assessed: P7

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Median increased from 24 to 40. Mean increased from 23.5 to 36.13 IQR before camp was $30-14 = 16$ and after camp was $41-34=7$	2 marks for two correct reasons 1 mark for one correct reason	2

(b) (2 marks)

Content: FM5: Annuities and loan repayments

Outcomes assessed: H8

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$N = 2500 \frac{(1 + 0.066/12)^{300} - 1}{(0.066/12)(1 + 0.066/12)^{300}}$ $N = \$366\,854.49$	2 marks for correct answer 1 mark for correct n and r or picking present value formula	2

(c) (1 mark)

Content: AM3: Algebraic skills and techniques M2: Applications of area and volume

Outcomes assessed: P6, H7

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Surface area is four times as big	1 mark for correct answer	1

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(d) (3 marks)

Content: FM4: Credit and Borrowing

Outcomes assessed: H8

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
William: $85 \times 5 \times 12 = 5100$ Interest = \$2100 Tahlia : Deposit: $0.15 \times 3000 = 450$ Owes: $3000 - 450 = 2550$ Interest: $2550 \times 0.15 \times 5 = \1912.50 Therefore Tahlia pays less interest	3 marks for correct answer 2 marks for correct William and progress towards Tahlia's interest 1 mark for correct interest for William	3

(e) (2 marks)

Content: M7: Spherical Geometry

Outcomes assessed: H7

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$78 + 28 = 106 = \text{angular distance}$ $106 \times 4 = 424 \text{ mins}$ $424 \div 60 = 7 \text{ hours } 4 \text{ mins}$ Therefore time in Quito is 11:56am	2 mark for correct answer 1 mark for finding time difference	2

Question 30

(a) (2 marks)

Content: PB2: Relative frequency and probability

Outcomes assessed: P2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Results are 22 24 26 42 44 46 62 64 66 Probability = $\frac{9}{36} = \frac{1}{4}$ OR $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$	2 mark for correct answer (Simplification not needed) 1 mark for a sample space or knowing total is 36 0 marks for a bald answer of 3/12	2

(b) (2 marks)

Content: FM2: Investing Money. AM3: Algebraic skills and techniques

Outcomes assessed: P8, H5

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$2 = (1 + 0.08/4)^n$ $n = 35 \text{ quarters} = 8.75 \text{ years}$ After 9 years, the money will double	2 mark for correct answer 1 mark for a correct compound interest statement	2

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(c) (1 mark)

Content: M4: Right-angled triangles

Outcomes assessed: P6, P11

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$8.4^2 = 70.56$ $5.6^2 + 4.2^2 = 49$ Therefore the triangle is not right-angled, Alan's measurements are not correct	1 mark for a correct use of Pythagoras' theorem	1

(d) (i) (1 mark)

Content: DA7: Correlation

Outcomes assessed: H11

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
The claims are incorrect because the y-intercepts are incorrect due to the scales being broken	1 mark for correct explanation	1

(d) (ii) (1) (2 marks)

Content: DA7: Correlation

Outcomes assessed: H9

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
3 median points are: (150, 68), (162.5, 70), (175, 85)	2 marks for finding all median points 1 mark for correctly finding two median points or grouping medians	2

(d) (ii) (2) (1 mark)

Content: DA7: Correlation

Outcomes assessed: H2, H11

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
When joining the points (150, 68) and (175, 85) the line formed is not parallel to the existing line	1 mark for correctly explanation	1

(e) (i) (2 marks)

Content: AM4: Modeling Linear and non-linear relationships, M5: Further applications of area and volume

Outcomes assessed: H3

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Square = $4x \times 4x = 16x^2$ Annulus = $\pi((2x)^2 - x^2) = 3\pi x^2$ Therefore discarded steel = $16x^2 - 3\pi x^2$	2 mark for correct expression 1 mark for area of square or annulus	2

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(e) (ii) (2 marks)

Content: AM1: Basic algebraic skills, M5: Further applications of area and volume

Outcomes assessed: P2, P7, H7

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$4x = 100$ $x = 25\text{mm} = 2.5\text{ cm}$ Discarded area = $16 \times 2.5^2 - 3 \times \pi \times 2.5^2$ 41.095... $= 41\text{ cm}^2$	2 mark for correct answer in square centimetres 1 mark for a value of x or correct conversion of an incorrect answer	2

(f) (2 marks)

Content: M3: Similarity AM3: Algebraic skills and techniques

Outcomes assessed: P6, H3

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
$\frac{x+1}{4} = \frac{x+1+x+2}{10}$ $\frac{x+1}{4} = \frac{2x+3}{10}$ $10x+10 = 8x+12$ $x = 1$	2 mark for correct answer 1 mark for a correct similarity ratio	2

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