CATHOLIC SECONDARY SCHOOLS ASSOCIATION
2006 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
GENERAL MATHEMATICS – MARKING GUIDELINES/SOLUTIONS

Question	Marks	Content	Syllabus Outcomes	Targeted Performance Bands
1	1	DA4: Summary statistics	P2, P7	2-3
2	1	M7:Spherical geometry	H2, H7	2-3
3	1	AM1: Basic algebraic skills	P2, P3	2-3
4	1	AM3:Algebraic skills and techniques	H2	3-4
5	1	M5: Further applications of area & volume	H2, H6	3-4
6	1	FM4: Credit & borrowing	H2, H5, H8	3-4
7	1	AM4:Modelling linear and non-linear relationships	H2, H3, H5	3-4
8	1	DA5: Interpreting sets of data	H4, H5, H9	3-4
9	1	DA2: Data collection & sampling	P9, P11	4-5
10	1	M2:Applications of area and volume	P2, P6	3-4
11	1	FM6: Depreciation	H2, H5	3-4
12	1	DA5: Interpreting sets of data	H4, H5, H9	3-4
13	1	PB2:Relative frequency & probability	P2, P10	3-4
14	1	M1: Units of measurement	P2, P6	3-4
15	1	FM2: Investing money	P2, P3	4-5
16	1	PB3: Multi-stage events	H2, H4, H10	4-5
17	1	M6: Applications of trigonometry	H2, H6	3-4
18	1	DA6: The Normal Distribution	H4, H9	4-5
19	1	PB2:Relative frequency & probability PB3: Multi-stage events	P2, P10 H2, H3, H10	4-5
20	1	FM3: Taxation	P2, P8	4-5
21	1	FM1: Earning money	P2, P7, P8	5-6
22	1	AM2:Modelling and linear relationships	P4, P5	5-6
SECTION 2				
23(a)	2	M4: Right angled triangles	P2, P6	3-4
23(b)(i)	1	DA3: Displaying single data sets	P4, P7	3-4
23(b)(ii)	2	DA2: Data collection & sampling DA3: Displaying single data sets	P4, P9, P11	3-4
23(c)(i)	1	M3: Similarity of two-dimensional figures	P2, P6	3-4
23(c)(ii)	2	M3: Similarity of two-dimensional figures	P2, P6, P7	3-4
23(d)(i)	2	FM2: Investing money	P2, P8	3-4
23(d)(ii)	1	FM2: Investing money	P2, P8	2-3
23(d)(iii)	2	FM2: Investing money	P2, P8	3-4

24(a)	2	M4: Right angled triangles	P2,P6	4-5
24(b)(i)	1	DA3: Displaying single data sets	P7	2-3
24(b)(ii)	1	DA4: Summary statistics	P2, P7	2-3
24(b)(iii)	3	DA5: Interpreting sets of data	H1, H2, H4, H5, H9, H11	5-6
24(c)	2	DA2: Data collection & sampling	P9	4-5
24(d)(i)	1	FM4: Credit & borrowing	H2, H5, H8	3-4
24(d)(ii)	1	FM4: Credit & borrowing	H2, H5, H8	4-5
24(d)(iii)	2	FM4: Credit & borrowing	H2, H5, H8, H11	5-6
25(a)(i)	1	PB1: The language of chance	P3, P10	3-4
25(a)(ii)	1	PB3: Multi-stage events	H3, H4,H10	3-4
25(a)(iii)	2	PB2:Relative frequency & probability PB3: Multi-stage events	P2,P10, H4, H10	5-6
25(b)(i)	1	DA6: The Normal Distribution	H2, H4, H5, H9, H11	3-4
25(b)(ii)	1	DA6: The Normal Distribution	H2, H4, H5, H9, H11	3-4
25(b)(iii)	1	DA6: The Normal Distribution	H2, H4, H5, H9, H11	3-4
25(c)(i)	2	DA4: Summary Statistics	P2, P7	3-4
25(c)(ii)	2	DA5: Interpreting sets of data	H1, H2, H4, H5, H9, H11	4-5
25(c)(iii)	2	DA5: Interpreting sets of data	H4, H10	5-6
26(a)(i)	1	AM1: Basic algebraic skills	P2, P3, P7	2-3
26(a)(ii)	3	AM1: Basic algebraic skills	P2, P3, P7	4-5
26(b)(i)	2	FM5: Annuities & loan repayments	H2, H5, H8	3-4
26(b)(ii)	2	FM5: Annuities & loan repayments	H2, H5, H8	4-5
26(c)(i)	1	M7:Spherical geometry	H2, H6	3-4
26(c)(ii)	1	M7:Spherical geometry	H2, H6	2-3
26(c)(iii)	1	M7:Spherical geometry	H2, H6, H7	3-4
26(c)(iv)	2	M7:Spherical geometry	H2, H6, H7	5-6
27(a)	3	AM1: Basic algebraic skills	P2, P3	4-5
27(b)(i)	1	M6: Applications of trigonometry	H1, H2, H6	3-4
27(b)(ii)	1	M6: Applications of trigonometry	H2, H6	3-4
27(b)(iii)	1	M6: Applications of trigonometry	H2, H6, H7	3-4
27(b)(iv)	3	M6: Applications of trigonometry	H1, H2, H6, H7	3-4
27(c)	2	AM3:Algebraic skills and techniques	H2, H3, H7, H11	5-6
27(d)	2	PB4: Applications of probability	H2, H4, H10	4-5
28(a)(i)	2	PB3: Multi-stage events	H2, H3, H10	4-5
28(a)(ii)	2	PB2:Relative frequency & probability	P2, P10	4-5
28(b)(i)	1	FM5: Annuities & loan repayments	H2, H5, H8	2-3
28(b)(ii)	2	FM5: Annuities & loan repayments	H2, H5, H8	3-4
28(c)(i)	2	AM4:Modelling linear and non-linear relationships	H2, H3	4-5
28(c)(ii)	1	AM4:Modelling linear and non-linear relationships	H2,H3, H5, H11	5-6
28(c)(iii)	1	AM4:Modelling linear and non-linear relationships	H2, H3, H5	4-5
28(c)(iv)	2	AM4:Modelling linear and non-linear relationships	H2, H3, H5, H11	4-5

Section 1

Q1. C	Q5. C	Q9. C	Q13. D	Q17. A	Q21. B
Q2. A	Q6. D	Q10. C	Q14. C	Q18. D	Q22. A
Q3. A	Q7. D	Q11. B	Q15. B	Q19. C	
Q4. B	Q8. D	Q12. A	Q16. B	Q20. C	

Section 2

Question	Solution	Criteria	Marks
23(a)	$\tan 43° = \frac{x}{15}$ $x = 15 \times \tan 43°$ $= 13.9877..$ $= 14.0m$	**2 marks** for using trig ratio and obtaining correct answer **1 mark** for using trig ratio	2
23(b)(i)	20% of 65 000= 13 000hectares	**1 mark** for correct answer	1
23(b)(ii)	Sector, column or picture graph NOT histogram because it is categorical data	**2 marks** for correct alternative graph and correct reason **1 mark** for a correct part of the answer	2
23(c)(i)	$\frac{x}{16} = \frac{12.5}{5}$ $x = 40cm$	**1 mark** for correct answer	1
23(c)(ii)	$Area = p \times \frac{5}{2} \times \frac{16}{2}$ $= 20pcm$ $= 62.83185...cm^{2}{}^{2}$	**2 marks** for correct working and answer **1 mark** for using correct formula.	2
23(d)(i)	Cost of shares = 1000×3.98 = \$3980 Brokerage fee = 1% of \$3980 = 0.01×3980 = \$39.80 Total cost = 3980 + 39.80 = \$4019.80	**2 marks** for correct working and answer **1 mark** for correct calculation of brokerage fee or for correct total cost from incorrect calculation of brokerage fee or cost of shares	2
23(d)(ii)	Dividend = $1000 \times 20¢$ = 1000×0.20 = \$200	**1 mark** for correct answer	1

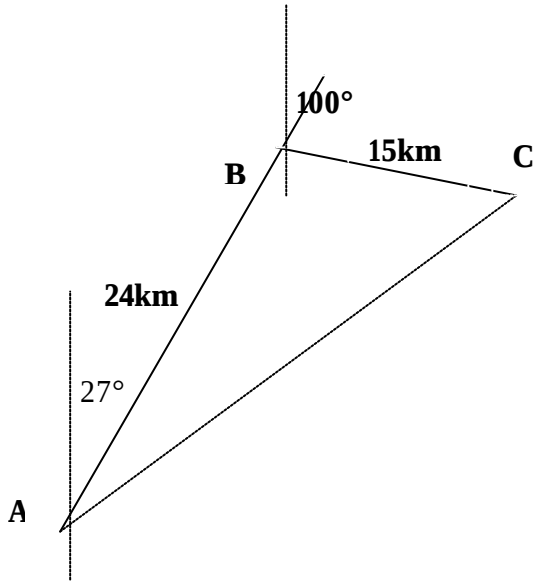
Question	Solution	Criteria	Marks
23(d)(iii)	Dividend yield $= \frac{\text{dividend}}{\text{market value}} \times \frac{100}{1}$ $= \frac{0.20}{3.98} \times \frac{100}{1}$ $= 5.0251\ldots$ $= 5.03\%$ **OR** Dividend yield $= \frac{\text{dividend}}{\text{market value}} \times \frac{100}{1}$ $= \frac{200}{3980} \times \frac{100}{1}$ $= 5.03\%$	**2 marks** for correct working and answer **1 mark** for use of dividend yield formula but incorrect calculation or substitution	2
24(a)	$l = \sqrt{15^2 + 7.4^2}$ $= 16.724...$ $= 17m$	**2 marks** for using Pythagoras and obtaining correct answer **1 mark** for use of Pythagoras	2
24(b)(i)	Melbourne	**1 mark** for correct answer	1
24(b)(ii)	100mm	**1 mark** for correct answer	1
24(b)(iii)	Similar shapes, Sydney- symmetrical Melbourne- slight positive skew More consistent rain in Melbourne because spread is less. Range S(63) c.f. M(20), IQR-S(45) c.f. M(10) Quite different locations with Melbourne's maximum less than Sydney's minimum. Any other statement that compare and contrast.	**3 marks** for correct comments on each aspect **2 marks** for significant correct comments. **1 mark** for some relevant and correct comment.	3
24(c)	$\frac{p}{5} = \frac{10}{2}$ $p = 25$	**2 marks** for correct ratio and correct answer **1 mark** for progress towards answer	2

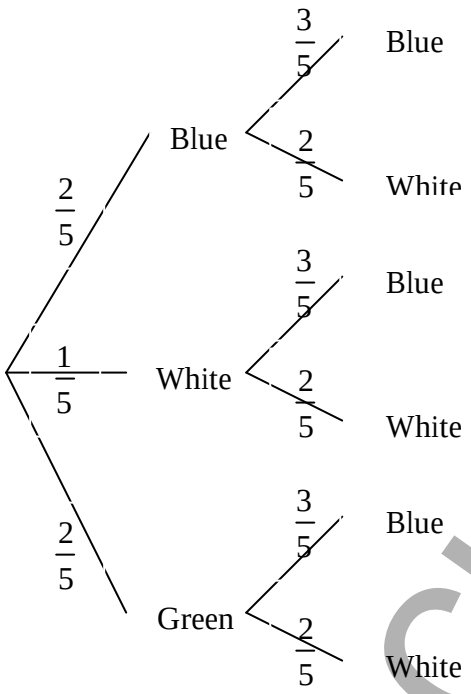
Question	Solution	Criteria	Marks
24(d)(i)	Interest = Prn $= 45000 \times 0.012 \times 1$ = \$540 **OR** Interest = $A(1 + r)^n$ $= 45000(1 + 0.012)^1$ = \$540	**1 mark** for correct answer	1
24(d)(ii)	Amount owing = Balance + interest – payment = 45000 + 540 – 512 = \$45028 **or** Amount owing = Balance + interest – payment = 45000 + 540 – 512 = \$45028	**1 mark** for correct answer	1
24(d)(iii)	Kurt should not take out the loan because the repayments (\$512) do not cover the interest (\$540). Therefore the loan could never be repaid.	**2 marks** for correct conclusion and correct justification **1 mark** for correct conclusion without a reasonable justification	2
25(a)(i)	5 x 3 x 6 = 90	**1 mark** for correct calculation.	1
25(a)(ii)	$\frac{1}{5\times3\times6}=\frac{1}{90}$	**1 mark** for correct answer	1
25(a)(iii)	$1\times\frac{2}{3}\times\frac{5}{6}=\frac{10}{18}$ $=\frac{5}{9}$	**2 marks** for correct answer **1 mark** for any correct part of answer	2
25(b)(i)	68%	**1 mark** for correct answer	1
25(b)(ii)	460mm	**1 mark** for correct answer	1
25(b)(iii)	$2\frac{1}{2}\%$	**1 mark** for correct answer	1
25(c)(i)	$median = \frac{11+14}{2} = 12.5$ Standard deviation= 2.7	**2 marks** for both correct answers **1 mark** for one correct answer.	2

Question	Solution	Criteria	Marks
25(c)(ii)	Crusaders (142 goals) c.f. Bulls (134 goals) Answer: Crusaders by 8 goals.	**2 marks** for correct calculations of total goals and conclusion **1 mark** for progress towards answer.	2
25(c)(iii)	The Bulls are more consistent because they had a lower standard deviation (1.1) compared to the Crusaders (2.7)	**2 marks** for comparing standard deviations and correct conclusion. **1 mark** for comparing standard deviations and incorrect conclusion.	2
26(a)(i)	$C = \frac{4x24}{4+12} = 6ml$	**1 mark** for correct answer.	1
26(a)(ii)	$12 = \frac{24n}{n+12}$ $24n = 12n + 144$ $n = 12 years$	**3 marks** for correct substitution into formula and correct answer. **2 marks** for significant accurate working towards answer. **1 mark** correct substitution into formula.	3
26(b)(i)	$A = M\left[\frac{(1+r)^n - 1}{r}\right]$ $= 150\left[\frac{(1+0.0045)^{60} - 1}{0.0045}\right]$ $= 150\left[\frac{1.0045^{60} - 1}{0.0045}\right]$ $= \$10305.71$ **OR** Using graphic calculator: n = 5 × 12 I = 5.4% PV = 0 PMT = 150 FV = 0 P/Y = 12 C/Y = 12 ∴ FV = $10305.71	**2 marks** for use of FV formula and correct substitution **1 mark** for use of FV formula	2

Question	Solution	Criteria	Marks
26(b)(ii)	$N = \frac{A}{(1+r)^n}$ $= \frac{10305.71}{(1+0.0045)^{60}}$ $= \frac{10305.71}{1.0045^{60}}$ $= \$7871.93$ **OR** Using graphic calculator: n = 5×12 I = 5.4% PV = 0 PMT = 0 FV = 10305.71 P/Y = 12 C/Y = 12 $\therefore$ PV = \$7871.93 **OR** $N = M\left[\frac{(1+r)^n - 1}{r(1+r)^n}\right]$ $= 150\left[\frac{(1+0.0045)^{60} - 1}{0.0045(1+0.0045)^{60}}\right]$ $= 150\left[\frac{1.0045^{60} - 1}{0.0045(1.0045)^{60}}\right]$ $= \$7871.93$ **OR** Using graphic calculator: n = 5×12 I = 5.4% PV = 0 PMT = 150 FV = 0 P/Y = 12 C/Y = 12 $\therefore$ PV = \$7871.93	**2 marks** for use of either PV formula and correct substitution **1 mark** for use of either PV formula	2
26(c)(i)	59°+34° = 93°	**1 mark** for correct answer	1

Question	Solution	Criteria	Marks
26(c)(ii)	93 x 60 = 5 580 nautical miles $l = \frac{q}{360} 2pr$ $= \frac{93}{360} \times 2 \times p \times 6400$ $= 10388.1997...$ =5609 nautical miles	**1 mark** for correct answer	1
26(c)(iii)	t = $\frac{5580}{360}$ = 15.5 hours =15hrs 30 min.	**1 mark** for correct answer	1
26(c)(iv)	Time difference = (151-28)° x $\frac{4}{60}$ = 8.2hrs 5pm – 8.2hrs = 8:48am	**2 marks** calculating time difference and correct time **1 mark** for calculations working towards answer.	2
27(a)	$3(4y-2) + 2(3y+4) = 36$ $12y-6+6y+8 = 36$ $18y = 34$ $y = \frac{34}{18}$ $= \frac{17}{9}$ $= 1\frac{8}{9}$	**3 marks** for correct expansion and simplification to obtain correct answer. **2 marks** for significant accurate working towards answer. **1 mark** for some correct expansion and/or simplification.	3
27(b)(i)	d = 24 cos63° = 10.89577199 =10.9km	**1 mark** for correct working and answer	1

Question	Solution	Criteria	Marks
27(b)(ii)		**1 mark** for correct diagram containing all information.	1
27(b)(iii)	$\angle ABC = 27° + 80° = 107°$	**1 mark** for correct answer.	1
27(b)(iv)	Cosine rule $AC^2 = \sqrt{15^2 + 24^2 - 2\times 15\times 24\times \cos 107°}$ $=31.8042077$ Ans = 32km	**3 marks** for using cosine rule correctly and correctly rounding off to 32km. **2 marks** for using cosine rule correctly. **1 mark** for use of cosine rule.	3
27(c)	$(0.97)^n = 0.8$ Guess & check $(0.97)^7 = 0.807...$ $(0.97)^8 = 0.783...$ Answer = 8 times **OR** by logs $x = \frac{\log 0.8}{\log 0.97} = 7.32...$ Answer = 8 times	**2 marks** for evidence of guess & check (or logs) and correctly determining the answer. **1 mark** for some logical working towards answer.	2

Question	Solution	Criteria	Marks
27(d)	Financial Exp = (15 000 x $\frac{1}{5}$)+ (10 000 x $\frac{1}{5}$) +(1 000 x $\frac{1}{5}$) + (50 x $\frac{1}{5}$) + (1 x $\frac{1}{5}$) = \$5 210.20	**2 marks** for correct working and answer **1 mark** for correct formula and some substitution	2
28(a)(i)		**2 marks** for correct diagram and probabilities. **1 mark** for significant amount of correct information.	2
28(a)(ii)	From tree diagram: Blue/White($\frac{4}{25}$)+Green/White($\frac{4}{25}$) +White/Blue($\frac{3}{25}$)+White/White($\frac{2}{25}$)= $\frac{13}{25}$ **OR** P(at least one white)= 1-P(neither white) =1- ($\frac{4}{5}\times\frac{3}{5}$) = 1-$\frac{12}{25}$ = $\frac{13}{25}$	**2 marks** for correct calculation and answer. **1 mark** for progress towards answer.	2

Question	Solution	Criteria	Marks
28(b)(i)	Payment = 18000×0.3080 = \$5544	**1 mark** for correct answer	1
28(b)(ii)	Total payments = 5544×3 = \$16632 Interest = 18000 – 16632 = \$1368	**2 marks** for correct answer **1 mark** for correct calculation of total payments or correct interest calculation from incorrect calculation of total payments	2
28(c)(i)	Total surface area = (top + base) + 4 sides $=2x^2+4[x(9-x)]$ $=2x^2+4x(9-x)$ $=36x-2x^2$	**2 marks** for correct surfaces and algebraic substitution to obtain answer. **1 mark** for some logical working towards answer.	2
28(c)(ii)	Surface area cannot be negative. Equation is negative for $x<0$ and $x>9$.	**1 mark** for correct explanation.	1
28(c)(iii)	Maximum volume when $x=6$	**1 mark** for correct answer	1
28(c)(iv)	$S=2x^2+4x(9-x)=2x36+24x3=144\text{cm}^2$	**2 marks** for correct substitution and correct answer. **1 mark** for some progress towards answer.	2

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