CATHOLIC SECONDARY SCHOOLS ASSOCIATION
2010 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
GENERAL MATHEMATICS – MARKING GUIDELINES/SOLUTIONS

Section 1

Question 1 – Question 22 (1 mark each)

Question	Answer	Content	Syllabus Assessed	Targeted Performance Bands
1	D	AM1: Basic algebraic skills.	P2	2-3
2	C	PB1: The language of chance.	P11	2-3
3	D	M6: Applications of trigonometry.	H6	3-4
4	C	AM4: Modelling linear and non-linear relationships.	H3	3-4
5	D	FM2: Investing money	P3	3-4
6	C	PB3: Multi-stage events.	H2, H3, H10	2-3
7	A	DA5: Interpreting sets of data.	H2, H4, H9, H11	3-4
8	D	DA4: Summary statistics.	P2, P4, P7	3-4
9	B	M1: Units of measurement.	P2	3-4
10	C	FM2: Investing money.	P2	3-4
11	C	DA2: Data collection and sampling.	P9, P11	3-4
12	D	FM4: Credit and Borrowing	H1, H2	3-4
13	C	M5: Further applications of area and volume.	H1, H6	3-4
14	C	PB3: Multi-stage events.	H2, H3	3-4
15	B	M7: Spherical geometry.	H1, H7	3-4
16	B	FM5: Annuities and loan repayments.	H2, H8	3-4
17	C	FM6: Depreciation	H5	3-4
18	B	AM3: Algebraic skills and techniques.	H2, H3, H7	4-5
19	D	M3: Similarity of 2 dimensional figures.	P6	4-5
20	A	DA6: The normal distribution.	H2, H4, H5, H9	4-5
21	D	DA7: Correlation.	H2, H4, H9	5-6
22	C	AM4: Modelling linear and non-linear relationships.	H2, H3	5-6

Content: PM5: Taxation
Outcomes assessed: P11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$\frac{4312}{110} \times 10 = \$392$	**1 mark** for correct answer.	1

(b) (i) (2 marks)
Content: M5: Further applications of area and volume
Outcomes assessed: H1, H6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$A \approx \frac{20}{3}(16+18+80)+\frac{20}{3}(18+16+56)$ $= 760 + 600$ $= 1360m^2$	**2 marks** for correct answer. **1 mark** for correct substitution into Simpson's rule.	2

(b) (ii)
Content: M2: Applications of area and volume, M5: Further applications of area and volume
Outcomes assessed: P6, H6
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$Volume = Area \times depth$ $= 1360 \times 3$ $= 4080m^3$ $= 4\ 080\ 000$ L	**2 mark** for correct answer in Litres. **1 mark** for correct volume in m^3.	2

(c) (i) (2 marks)
Content: DA5: Interpreting sets of data
Outcomes assessed: H2, H4, H9
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$X = 75 - 51 = 24$ $Y = 35 + 51 = 86$	**2 mark** for both correct answer. **1 mark** for either correct answer.	2

(c) (ii) (1 mark)
Content: DA5: Interpreting sets of data
Outcomes assesse:, H2, H4, H9
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$Percentage = \frac{50}{125} \times \frac{100}{1} = 40\%$	**1 mark** for correct answer.	1

(c) (iii) (1 mark)
Content: DA5: Interpreting sets of data
Outcomes assessed: H2, H4, H9
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$Percentage = \frac{35}{50} \times \frac{100}{1} = 70\%$	**1 mark** for correct answer.	1

(c) (iv) (1 mark)
Content: PB4: Applications of probability
Outcomes assessed: H10
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$\Pr obability = \frac{35}{125} = \frac{7}{25}$	**1 mark** for correct answer.	1

(d) (i) (1 mark)
Content: AM4: Modelling linear and non-linear relationships
Outcomes assessed: H2, H5
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
$h = -2.9^2 + 5.8 \times 2.9 + 1.2$ $= 9.61m$	**1 mark** for each correct answer.	1

(d) (ii) (1 mark)
Content: AM4: Modelling linear and non-linear relationships
Outcomes assessed: H2, H5
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
A=1.2	**1 mark** for correct answer.	1

A represents the height of the platform above the ground.	**1 mark** for correct answer.	1

Question 24

(a) (i) (1 mark)

Content: DA3: Displaying single data sets

Outcomes assessed: P4, P9, P11

Targeted Performance Bands: 2-3

Solution	Criteria	Mark
30¢	**1 mark** for correct answer.	1

(a) (ii) (1 mark)

Content: DA3: Displaying single data sets

Outcomes assessed: P4, P9, P11

Targeted Performance Bands: 2-3

Solution	Criteria	Mark
1975	**1 mark** for correct answer.	1

(a) (iii) (1 mark)

Content: DA3: Displaying single data sets

Outcomes assessed: P4, P9, P11

Targeted Performance Bands: 3-4

Solution	Criteria	Mark
The horizontal scale (Year) is not divided evenly.	**1 mark** for correct answer.	1

(b) (i) (1 mark)

Content: FM1: Earning money

Outcomes assessed: P1

Targeted Performance Bands: 3-4

Solution	Criteria	Mark
Discount =\$195-\$118.95=\$76.05 Percentage discount= $\frac{76.05}{195} = 0.39 = 39\%$	**1 mark** for correct answer.	1

(b) (ii) (2 marks)
Content: FM4: Credit and borrowing
Outcomes assessed: H5
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$Interest = \frac{0.1875}{365} \times 118.95 \times 17$ $= 1.038775685$ $= \$1.04$ Total to be repaid: $\$1.04+\$118.95=\$119.99$	**2 marks** for correct answer. **1 mark** significant progress towards answer.	2

(c) (i) (1mark)
Content: PB1: The language of chance
Outcomes assessed: P3
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
$3 \times 6 \times 4 = 72$ choices	**1 mark** for correct answer.	1

(c) (ii) (1 mark)
Content: PB1: The language of chance
Outcomes assessed: P10, P11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
Menu 1: $3 \times 6 \times 4 = 72$ choices Menu 2: $3 \times 7 \times 5 = 105$ choices Therefore there are 33 more meal choices possible.	**1 mark** for correct answer.	1

(d) (i) (1 mark)
Content: FM3: Taxation
Outcomes assessed: P2
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
Gross income: $\$784 \times 52 = \$40\,768$	**1 mark** for correct answer.	1

(d) (ii) (1 mark)
Content: FM3: Taxation
Outcomes assessed: P2
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
Taxable income:	**1 mark** for correct answer.	1

Total tax payable: $4 350+(2 694×0.30)+$4 978.20 Weekly tax: $4978.20 ÷ 52 = $95.73 Net weekly income: $784-$95.73=$688.27	**3 marks** for correct answer. **2 marks** for significant progress towards answer. **1 mark** for correctly reading tax table and calculating total tax.	3

Question 25

(a) (2 marks)

Content: M4: Right angled triangles

Outcomes assessed: P7, P11

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\sin\theta = \frac{15}{20}$ $\therefore \theta = 48.59037789$ $= 49°$ (to nearest degree)	**2 marks** for correct answer with correct rounding. **1 mark** for correct answer with incorrect rounding.	2

(b) (3 marks)

Content: M2: Applications of area and volume, M5: Further applications of area and volume

Outcomes assessed: P2, P6, H2, H6

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Volume of shaded region is Total Volume – Volume of top section $V = \frac{1}{3}\pi(6^2 \times 16 - 3^2 \times 8)$ $= 527.787565...cm^3$ $= 528cm^3$ to nearest cm^3.	**3 marks** for correct answer. **2 marks** for indicating the need to subtract 1 volume from the other. **1 mark** using volume of a cone formula. .	3

(c) (i) (1 mark)

Content: DA6: The normal distribution

Outcomes assessed: H2, H4, H5, H9

Targeted Performance Bands: 2-3

Solution	Criteria	Mark
156	**1 mark** for correct answer.	1

(c) (ii) (2 marks)

Content: DA6: The normal distribution

Outcomes assessed: H2, H4, H5, H9

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Mean = 156 Standard deviation = 8	**2 marks** for both correct answers. **1 mark** for either correct answer.	2

(c) (iii) (1 mark)

Content: DA6: The normal distribution

Outcomes assessed: H2, H4, H5, H9

Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$z = \frac{x - \bar{x}}{\sigma}$ $= \frac{170 - 156}{8}$ $= \frac{14}{8}$ $= 1.75$	**1 mark** for correct answer.	1

(c) (iv) (2 marks)

Content: DA6: The normal distribution

Outcomes assessed: H2, H4, H5, H9, H11

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Amanda is not correct. A height 3 standard deviations above the mean is 180 cm. Any height greater than 180 cm is extremely unlikely and has a probability of only 0.15%, but it is not impossible.	**2 marks** for correct answer with explanation. **1 mark** for correct statement with no explanation.	2

$\frac{5\times4}{2!}$ = 10 different sums	**1 mark** for correct answer.	1

(d) (ii) (1 mark)
Content: PB3: Multi-stage events
Outcomes assessed: H10, H11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
\$100, \$50 \$100, \$20 \$100, \$10 \$100, \$5	**1 mark** for correct answer.	1

Question 26
(a) (i) (1 mark)
Content: DA5: Interpreting sets of data
Outcomes assessed: H2, H4, H5, H11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
Interquartile range: 23 – 16 = 7	**1 mark** for correct answer.	1

(a) (ii) (1 mark)
Content: DA5: Interpreting sets of data
Outcomes assessed: H2, H4, H5, H11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
25%	**1 mark** for correct answer.	1

(a) (iii) (1 mark)
Content: DA5: Interpreting sets of data
Outcomes assessed: H2, H4, H5, H11
Targeted Performance Bands: 4-5

Solution	Criteria	Mark
Positively skewed	**1 mark** for correct answer.	1

(b) (i) (1 mark)
Content: FM4: Credit and Borrowing
Outcomes assessed: H1
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
$7.75×250=$1 937.50	**1 mark** for correct answer.	1

(b) (ii) (1 mark)
Content: FM4: Credit and Borrowing
Outcomes assessed: H2
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$1 937.50×2×20= $465 000	**1 mark** for correct answer.	1

(b) (iii) (1 mark)
Content: FM4: Credit and Borrowing
Outcomes assessed: H2
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$465 000-$250 000=$215 000	**1 mark** for correct answer.	1

(b) (iv) (2 marks)
Content: FM4: Credit and Borrowing
Outcomes assessed: H5
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
It would be of benefit to pay the loan off over 15 years as the total interest paid would be less.	**2 marks** for correct answer with appropriate reason. **1 mark** for stating it would be of benefit.	2

(c) (i) (1 mark)
Content: AM2: Modelling linear relationships
Outcomes assessed: P3, P4, P5
Targeted Performance Bands: 4-5

Solution	Criteria	Mark
Gradient $= -\frac{1}{50}$ $= -0.02$	**1 mark** for correct answer or equivalent.	1

$F = -0.02s + 13$	**1 mark** for correct answer.	**1**

(d) (3 marks)
Content: AM3: Algebraic skills and techniques
Outcomes assessed: H2
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$\frac{3(x+3)}{15} - \frac{5(x-5)}{15} = 2$ $3x + 9 - 5x + 25 = 30$ $-2x + 34 = 30$ $-2x = -4$ $x = 2$	**3 marks** for correct answer. **2 marks** for mostly correct simplification. **1 mark** for creating a common denominator.	3

Question 27
(a) (i) (1 mark)
Content: DA3: Displaying single data sets
Outcomes assessed: P4, P9, P11
Targeted Performance Bands: 2-3

Solution	Criteria	Mark
48-50	**1 mark** for correct answer.	1

(a) (ii) (1 mark)
Content: DA3: Displaying single data sets
Outcomes assessed: P4, P9, P11
Targeted Performance Bands: 3-4

Solution	Criteria	Mark
48g, 49g or 50g	**1 mark** appropriate estimate.	1

(a) (iii)(1 mark)
Content: DA3: Displaying single data sets
Outcomes assessed: P4, P9, P11
Targeted Performance Bands: 4-5

Solution	Criteria	Mark
We cannot be sure. The minimum weight of the 10 mice could have been 42, 43 or 44 grams.	**1 mark** for correct answer.	1

(b) (2 marks)

Content: PB4: Applications of probability

Outcomes assessed: H10, H11

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Financial expectation: $\frac{1}{4}\times\$3+\frac{1}{2}\times-(\$2)+\frac{1}{4}\times\$3=\$0.50$	**2 marks** for correct solution. **1 mark** for significant progress towards correct solution.	2

(c) (3 marks)

Content: FM5: Annuities and loan repayments

Outcomes assessed: H8

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$N=\frac{A}{(1+r)^n}$ $=\frac{480000}{(1.0125)^{96}}$ $=145652.5781$ She would need to invest \$145 652.58 Graphics Calculator: n: 96 I%: 5 PV: 0 PMT: 0 FV: 480 000 P/Y: 4 C/Y: 4	**3 marks** for correct answer. **2 marks** for correct substitution into present value formula OR correct values for graphics calculator. **1 mark** for recognising present value OR mostly correct values in graphics calculator.	3

(d) (i) (1 mark)

Content: AM2: Modelling linear relationships

Outcomes assessed: P3

Targeted Performance Bands: 3-4

Solution	Criteria	Mark
h	**1 mark** for correct answer.	1

$h = 12(0.7)^0$ $= 12m$	**1 mark** for correct answer.	1

(d) (iii) (2 marks)

Content: AM3: Algebraic skills and techniques

Outcomes assessed: H2, H3, H7, H11

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$h = 12(0.7)^n$ by guess and check, when n=7, h= 0.9882512 The 7^{th} bounce will not reach a height of 1m	**2 marks** for correct answer. **1 mark** for progress towards answer.	2

(d) (iv) (1 mark)

Content: AM4: Modelling linear and non-linear relationships

Outcomes assessed: H1, H2, H3, H5, H11

Targeted Performance Bands: 4-5

Solution	Criteria	Mark
The model assumes the ball will bounce forever which is not the reality.	**1 mark** for correct answer.	1

Question 28

(a) (i) (1 mark)

Content: M7: Spherical geometry

Outcomes assessed: H6, H7

Targeted Performance Bands: 4-5

Solution	Criteria	Mark
Difference on longitude = 75° Time difference is 5 hours. Therefore 5.00 pm in Delhi is 10.00 pm in Sydney (on 3rd October)	**1 mark** for correct answer.	1

(a) (ii) (3 marks)

Content: M7: Spherical geometry

Outcomes assessed: H7, H11

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Flight time: $5600 \div 400 = 14 hours$ Tony's flight would need to land in New Delhi no later than 2.00 pm on 3rd Oct. This corresponds to 7.00pm Sydney time. The flight would need to leave no later than 14 hours before 7.00 pm, i.e. 5.00 am on 3rd Oct.	**3 marks** for correct answer. **2 marks** correctly calculating arrival time in New Delhi and corresponding Sydney time. **1 mark** for calculating flight time.	3

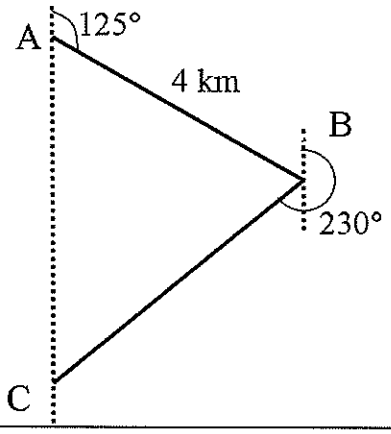
(b) (2 marks)

Content: FM6: Depreciation

Outcomes assessed: H5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$10000 = 36000 - 0.25N$ $N = 36000 - \frac{10000}{0.25}$ $N = 104000 km$	**2 marks** for correct answer. **1 mark** for recognising straight line depreciation.	2

	**1 mark** for correct sketch.	1

(c) (ii) (3 marks)

Content: M6: Applications of trigonometry

Outcomes assessed: H6

Targeted Performance Bands: 4-5

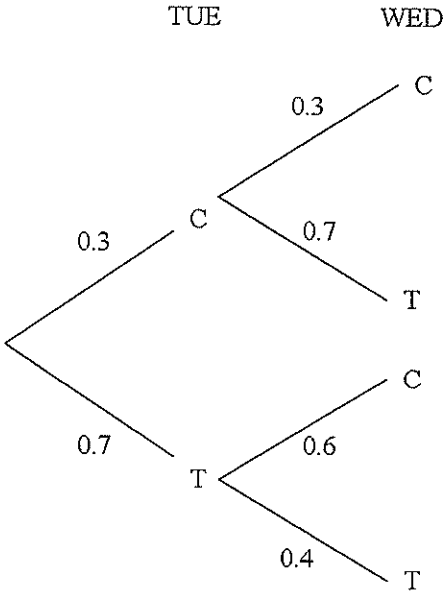
Solution	Criteria	Marks
$\frac{a}{\sin A} = \frac{b}{\sin B}$ $\frac{b}{\sin 75°} = \frac{4}{\sin 50°}$ $b = \frac{4\sin 75°}{\sin 50°}$ $= 5.043706458...$ $= 5.0km$	**3 marks** for correct answer. **2 marks** for substituting correct angles into sine rule. **1 mark** for finding the necessary angles.	3

(d) (3 marks)

Content: PB4: Applications of probability

Outcomes assessed: H10, H11

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
 Probability of tea on Wednesday is: P(CT)+P(TT)= $0.3\times0.7 + 0.7\times0.4 = 0.49 = 49\%$	**3 marks** for correct solution. **2 marks** for correct tree diagram (or equivalent) **1 mark** for some progress towards answer.	3

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