WESTERN REGION

2007
TRIAL HIGHER SCHOOL CERTIFICATE
EXAMINATION

General Mathematics

SOLUTIONS

General Mathematics   Trial HSC Examination 2007

<u>Multiple Choice Answer Sheet</u>

Name _____Marking Sheet____

Completely fill the response oval representing the most 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 ●

SECTION II	MARK	COMMENTS
23 **(a) (i)** $A = \dfrac{h}{3}\left[d_f + d_l + 4d_m\right]$ $= \dfrac{15}{3}\left[18 + 10 + 4(20)\right]$ $= 5\left[\,108\,\right]$ $= 540\text{m}^2$	**2**	1 – Sub 1 - Answer
(ii) $V = Ah$ $\quad = 540 \times 0\cdot1$ $\quad = 54\text{m}^3$ $\text{Cost} = 54 \times \$15\cdot60$ $\qquad\quad = \$842.40$	**2**	1 – Volume 1 - Cost
(b) $\dfrac{2x-3}{4} + 5 = 9$ ${}^4\!\left(\dfrac{2x-3}{4}\right) + {}^4(5) = {}^4(9)$ $\qquad$ (1) $2x - 3 + 20 = 36$ $2x + 17 = 36$ $2x = 19$ $\qquad\qquad\qquad$ (1) $x = \dfrac{19}{2} = 9\dfrac{1}{2}$ $\qquad\qquad$ (1)	**3**	
(c) $M = N\left\{\dfrac{r \times (1+r)^n}{(1+r)^n - 1}\right\}$ $M = 290\,000\left\{\dfrac{0\cdot005 \times 1\cdot005^{240}}{1\cdot005^{240} - 1}\right\}$ $M = \$2\,077\cdot65$ $\text{Total Cost} = 2\,077\cdot65 \times 240$ $\qquad\qquad\quad = \$498\,636$	**3**	1 - Sub 1 – monthly repayment 1 - Answer
(d) $N = \dfrac{A}{(1+r)^n}$ $N = \dfrac{25000}{(1\cdot05)^{21}}$ $\quad = \$8973.56$ $\quad = \$8974 \quad \text{(nearest \$)}$	**2**	1 – sub 1 - Answer
(e) $0\cdot046\text{m}^2 = (0\cdot046 \times 100 \times 100)\ \text{cm}^2$ $\qquad\qquad = 460\text{cm}^2$	**1**	

	SECTION II	MARK	COMMENTS
24 (a) (i)	Angle AOB = $360 - 315 + 37$ $= 82°$	**1**	
(ii)	Area Δ AOB = $\frac{1}{2}$ ab sin C $= \frac{1}{2}$ (36)(49) sin 82° $= 873\cdot4\text{m}^2$ (1dp)	**2**	1 – Sub into formula 1 - Answer
(iii)	Distance AB $a^2 = b^2 + c^2 - 2bc \cos A$ $AB^2 = 36^2 + 49^2 - 2(36)(49) \cos 82°$ $AB = 56.6\text{m}$ (to 1dp)	**2**	1 – Sub into formula 1 - Answer
(b) (i)	<table><tr><td></td><td>uses</td><td>Not</td><td></td></tr><tr><td>Melanoma</td><td>14</td><td>46</td><td>60</td></tr><tr><td>No Mel</td><td>46</td><td>4</td><td>50</td></tr><tr><td>Total</td><td>60</td><td>50</td><td>110</td></tr></table>	**1**	
(ii)	%(Uses Sunscreen) $= \frac{60}{110} \times 100 = 54\cdot5\%$	**1**	
(iii)	P(screens/no melanoma) $= \frac{46}{110} = \frac{23}{55}$	**1**	
(iv)	Suncreen does not prevent Melanomas but helps to protect a person. A person using sunscreen is less likely to have a melanoma.	**1**	
(c)	$S \propto R^2$ $S = kR^2$ $16 = k \times 2^2$ $16 = 4k$ $k = 4$ $\therefore S = 4R^2$ $36 = 4R^2$ $R^2 = 9$ $R = 3$	**2**	1 – value of k 1 for value of R
(d)(i)	9000 dolls	**1**	
(ii)	$12.50 per doll	**1**	

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	SECTION II	MARK	COMMENTS
25 (a)		1	
(i)	P(Girl) = $\dfrac{8}{18} = \dfrac{4}{9}$	1	
(ii)	P(D. Licence) = $\dfrac{10}{18} \times \dfrac{6}{10} + \dfrac{8}{18} \times \dfrac{5}{8}$ $= \dfrac{11}{18}$	2	1 – Sub into formula 1 - Answer
(iii)	P(Girl Driver) = $\dfrac{8}{18} \times \dfrac{5}{8} = \dfrac{5}{18}$	1	1 - Answer
(iv)	P(Boy Non Driver) = $\dfrac{10}{18} \times \dfrac{4}{10} = \dfrac{2}{9}$	2	1 – Sub into formula 1 - Answer
(b)(i)	SA = $2\pi r^2 + 2\pi rh - 0.6$ $= 2\pi(3)^2 + 2\pi(3)(3) - 0.6$ $= 112.5 m^2$	2	1 – Sub into formula 1 - Answer
(ii)	$V = \pi(3)^2(3)$ $= 84\cdot82300165$	2	1 – Sub into formula 1 - Answer
(iii)	Capacity = $84\cdot823 \times 1000$ $= 84823$ Litres No. of weeks left = $84823 \div 1500$ $= 56.55$ weeks (2dp)	2	1 – Capacity 1 – Number of weeks

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	SECTION II	MARK	COMMENTS
26. (a) (i)		**1**	
(ii)	$\angle ASB = 180 - 47 - 26 = 107°$	**1**	
(iii)	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ $\dfrac{BS}{\sin 47} = \dfrac{40}{\sin 107}$ $BS = \dfrac{40\sin 47}{\sin 107}$ $BS = 30\cdot59\text{m}$ (2dp)	**1** **1**	
(b)			
(i)	Range $= 99 - 39 = 60$	**1**	
(ii)	Interquartile range $= 67 - 51\cdot5 = 15\cdot5$	**1**	
(iii)	Median $= 69$	**1**	
	$Q_1 = 58$	**1**	
	$Q_3 = 79$	**1**	
	Interquartile Range $= 79 - 58 = 21$	**1**	
(iv)	John scored better in English. His mark was above the upper quartile value meaning that he is in the top 25% of the class. In Mathematics he is just less that the upper quartile value.	**2**	1 – best performed subject 1 – reason
(v)	$\dfrac{5 - 1 + 4 + x}{4} = 6$ $x + 8 = 24$ $x = 16$	**1**	

	SECTION II	MARK	COMMENTS
27. (a)(i)	$S = V_0(1-r)^n$ $= 29990(1-0\cdot18)^3$ $= 29990(0\cdot82)^3$ $= \$16\ 535\cdot53$	2	1 – Sub into formula 1 - Answer
(ii)	$S = V_0(1-r)^n$ $9000 = 29990(0\cdot82)^n$ $0\cdot3 = (0\cdot82)^n$ Try $n = 5\ \ (0\cdot82)^5 = 0\cdot37$ $n = 6\ \ (0\cdot82)^6 = 0\cdot304$ $n = 7\ \ (0\cdot82)^7 = 0\cdot24$ $\therefore$ After 6 years	2	1 – Sub into formula 1 - Answer
(b)(i)	$z = \dfrac{x - \bar{x}}{s}$ $z = \dfrac{78 - 60}{8}$ $z = \dfrac{18}{8} = 2\cdot25$	1	
(ii)	John $z = \dfrac{52 - 60}{8} = -1$ $\therefore$ Scores higher $= 34 + 50 = 84\%$	1	
(iii)	$z = \dfrac{82 - 65}{9} = 1\cdot\bar{8}$ Cindy performed better on first test as score was more than 2 standard deviations above the mean whilst in the second it was below 2 standard deviations above mean.	2	1 – Answer 1 – reason
(c)	<table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>1</td><td><i>1</i></td><td><i>2</i></td><td><i>3</i></td><td><i>4</i></td><td><i>5</i></td><td>6</td></tr><tr><td>2</td><td><i>2</i></td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td></tr><tr><td>3</td><td><i>3</i></td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td></tr><tr><td>4</td><td><i>4</i></td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td></tr><tr><td>5</td><td><i>5</i></td><td>10</td><td>15</td><td>20</td><td>25</td><td>30</td></tr><tr><td>6</td><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td></tr></table>	3	

	SECTION II	MARK	COMMENTS
(d)	$P(\geq 10) = \dfrac{19}{36}$ $P(6 \leq \text{no.} \leq 9) = \dfrac{7}{36}$ $P(\leq 5) = \dfrac{10}{36}$ Financial Expectation $= \dfrac{19}{36} \times 3 + \dfrac{7}{36} \times 0$ $+ \dfrac{10}{36} \times -2$ $= \$1\cdot03$ Amt Paid $= 150 + 24 \times 35$ $= \$990$ Interest Paid $= 990 - 799$ $= \$191$ Yearly Interest $= \$95\cdot50$ Balance $= 799 - 150 = 649$ % interest $= \dfrac{95\cdot50}{649} \times 100 = 14\cdot7\%$	**3** **2**	1 1 1 1 1
28			

|	SECTION II	MARK	COMMENTS
(a)(i)	Angular distance XZ = 40°	**1**	
(ii)	X to Y = 70 + 30 = 100°	**2**	
	Method 1		
	$D = \dfrac{\theta}{360} \times 2\pi r$		
	$D = \dfrac{100}{360} \times 2\pi(6400) = 11170.10721 \text{km}$		1
	$\qquad\qquad = 6031 \text{nm}$		
	Or		1
	Method 2		
	Since 1° = 60 nm , $\qquad\qquad\qquad$ (1)		
	100° = 100 × 60 = 6000nm $\qquad\quad$ (1)		
(iii)	Time taken = $\dfrac{D}{S}$	**1**	
	$\qquad = \dfrac{6031}{60}$ = 100·5 hours		
	$\qquad\qquad$ = 4 days, 4 hours 30 min		
(iv)	Longitudinal difference = 100°.	**2**	
	Since 1° = 4 min		
	100° = 400min = 6h 40 min		
	Y is 6h 40 min ahead.		
	∴ Time at Y when ship leaves X $\quad$ = 12.40pm Mon 1st August		1 - time at Y relative to time at X
	∴ Time ship arrives at Y is		
	$\qquad$ 5.10 pm Friday 5th August		1 – Time of arrival
	NOTE: Method 2 gives a time taken of 4day and 4 hours meaning that the ship arrives at Y at 4.40p.m. Friday 5th August.		

28. (b)

    (i)   Strong Negative Correlation   1 mark

    (ii)   2 Marks

Distance from home
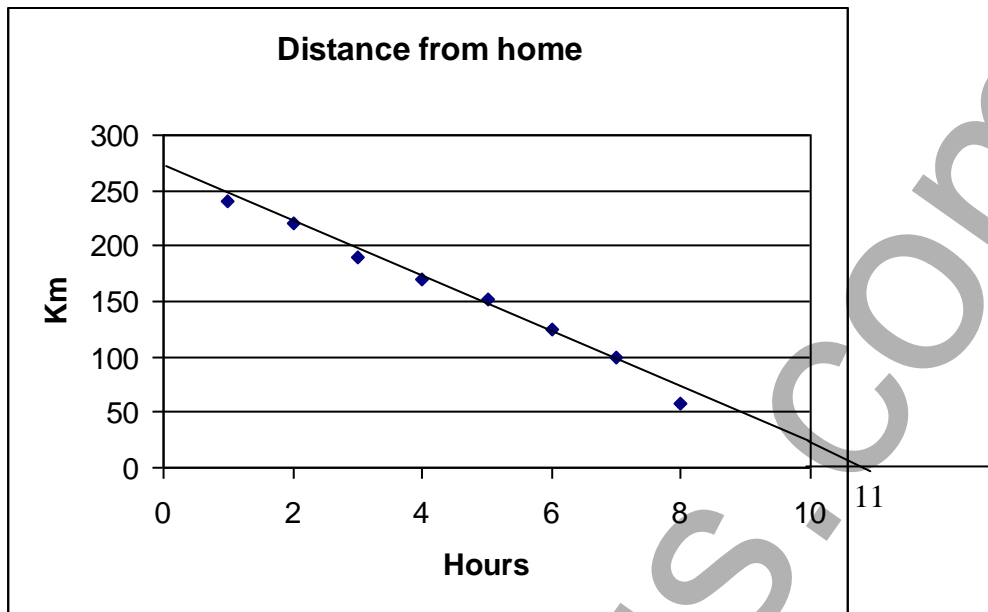
Linear regression line must pass through these two points, one mark off for each point that it doesn't pass through.

    (iii)   275 kilometres   1 mark

    (iv) $D = mH + b$ Graph passes through (2, 225) and (7, 100)

$$\text{Gradient} = \frac{Rise}{Run} = -\frac{125}{5} = -5 \qquad \text{1 mark}$$

(Negative gradient as line slopes to left)

        Y – intercept = 275

        ∴Equation of line is $D = -5H + 275$ 1 mark

    (v)   It takes the driver 11 hours to travel home.   1 mark