2009 HSC General Mathematics
Sample Answers

This document contains 'sample answers', or, in the case of some questions, 'answer may include'. These are developed by the examination committee for two purposes. The committee does this:

(a) as part of the development of the examination paper to ensure the questions will effectively assess students' knowledge and skills, and

(b) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The 'sample answers' or similar advice, are not intended to be exemplary or even complete responses. They have been reproduced in their original form as part of the examination committee's 'working document'. While the handwritten notes have been typed for legibility, no further editorial change or addition has occurred.

Section II

Question 23 (a) (i)

Sample answer:

$$\tan 38^\circ = \frac{h}{25}$$

$$h = 25\tan 38^\circ$$

$$= 19.5$$

Question 23 (a) (ii)

Sample answer:

$$\tan\theta = \frac{19.5}{62}$$

$$\theta = 17^\circ$$

Question 23 (b) (i)

Sample answer:

$$\text{Number of combinations} = 10 \times 10 \times 10 \times 10$$

$$= 10\,000$$

Question 23 (b) (ii)

Sample answer:

$$\text{Probability} = \frac{1}{2} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$$

$$= \frac{1}{2000}$$

Question 23 (c) (i)

Sample answer:

$A = 4.5^2 - 2 \times 1.8^2$
$= 13.77 \text{ m}^2$

Question 23 (c) (ii)

Sample answer:

$$\text{Number of Boxes} = \frac{110}{100} \times 13.77$$
$$= 15.147$$

$\therefore$ 16 boxes are required

Cost $= 16 \times 55$
$= \$880$

Question 23 (d) (i)

Sample answer:

Fees = account fee + 5 internet + 2 cash withdrawals + 4 EFTPOS + 2 cash another bank
$= \$4 + 5 \times \$0.30 + 2 \times \$0.50 + 4 \times \$0.50 + 2 \times \$2$
$= \$12.50$

Question 23 (d) (ii)

Sample answer:

Maximum amount $= 7 - 4$
$= \$3$

Question 24 (a) (i)

Sample answer:

78

Question 24 (a) (ii)

Sample answer:

$$\frac{45+47}{2} = 46$$

Question 24 (b) (i)

Sample answer:

$8 million

Question 24 (b) (ii)

Sample answer:

$5 million – $1 million = $4 million

Question 24 (c)

Sample answer:

eg Government decides to build:

- a pre-school because of the high number of children in an area.
- a nursing home because of a high number of elderly people in the area

Question 24 (d) (i)

Sample answer:

$x + y = 200$

Question 24 (d) (ii)

Sample answer:

Boots (*x)* can't be greater than 120 and sandals (*y)* can't be greater than 150.

Question 24 (d) (iii)

Sample answer:

Point B : $x = 50, y = 150$

$P = 24 \times 50 + 15 \times 150$

$= \$3450$

Point C : $x = 120, y = 80$

$P = 24 \times 120 + 15 \times 80$

$= \$4080$

$\therefore$ The profit at C (120, 80) is greater than the profit at B (50, 150).

Question 24 (e) (i)

Sample answer:

$S = V_0 - Dn$

$0 = 3600 - D \times 3$

$D = 1200$

Computer depreciates by \$1200 each year to be worth nothing after 3 years.

Question 24 (e) (ii)

Sample answer:

eg $S = V_0(1 - r)^n$

$= 3600(1 - 0.3)^n$

$= 3600 \times 0.7^n$

3600×0.7^n can never be zero since $0.7^n \neq 0$ for any value of n.

Question 25 (a)

Sample answer:

$$\begin{aligned} & 5 - 2(x + 7) \\ = \; & 5 - 2x - 14 \\ = \; & -2x - 9 \end{aligned}$$

Question 25 (b)

Sample answer:

$$\frac{50}{2.5 \times 10^6} = 2 \times 10^{-5} \text{ mg}$$

$$= 2 \times 10^{-8} \text{ g}$$

Question 25 (c) (i)

Sample answer:

$$A = \frac{12}{3}(0 + 4 \times 28 + 15)$$

$$= 508 \text{ m}^2$$

OR

$$A = 55 \times 24 - \left[\frac{12}{3}(35 + 4 \times 22 + 30) + \frac{12}{3}(20 + 4 \times 5 + 10)\right]$$

$$= 1320 - (612 + 200)$$

$$= 508 \text{ m}^2$$

Question 25 (c) (ii)

Sample answer:

$$\begin{aligned} V \; &= \; A \times 0.6 \\ &= \; 508 \times 0.6 \\ &= \; 304.8 \text{ m}^3 \end{aligned}$$

Capacity is 304.8 kL = 304 800 litres

$$\text{Number of times} = \frac{304\,800}{4}$$

$$= 76\,200$$

Question 25 (d) (i)

Sample answer:

$25.8 - 4.2 = 21.6°C$

Question 25 (d) (ii)

Sample answer:

Temperatures between 21.6 and 25.8 have z-scores between -1 and 0.

$$\text{Percentage} = \frac{1}{2} \times 68\%$$
$$= 34\%$$

Temperatures between 25.8 and 38.4 have z-scores from 0 to 3.

$$\text{Percentage} = \frac{1}{2} \times 99.7\%$$
$$= 49.85\%$$

Total Percentage = 34% + 49.85% = 83.85%

Question 26 (a) (i)

Sample answer:

6 – 2 = 4 hours

Question 26 (a) (ii)

Sample answer:

75%

Question 26 (a) (iii)

Sample answer:

Only when the same number of boys and girls are surveyed.

Question 26 (b) (i)

Sample answer:

$$\frac{135+105}{15} = 16$$

Question 26 (b) (ii)

Sample answer:

1 pm Tuesday

Question 26 (b) (iii)

Sample answer:

Message is sent 6pm Wednesday Denver time

6pm + 14 hours
= 8am Thursday

Question 26 (c) (i)

Sample answer:

$2200 \times 12 \times 20 = \$528\,000$

Question 26 (c) (ii)

Sample answer:

$\boldsymbol{A} = \$299\,300 \times 0.005$
$= \$1496.50$

$\boldsymbol{B} = \$299\,300 + \$1496.50 - \$2200$
$= \$298\,596.50$

Question 26 (c) (iii) (1)

Sample answer:

$$300\,000 = M\left\{\frac{1.005^{240} - 1}{0.005(1.005)^{240}}\right\}$$

Question 26 (c) (iii) (2)

Sample answer:

$2149.29

Question 27 (a) (i)

Sample answer:

6.4684×5000
$= \$32\ 342$

Question 27 (a) (ii)

Sample answer:

$407\ 100 \div 8.1420 = \$50\ 000$

Question 27 (a) (iii)

Sample answer:

$1000 \times 8.2857 - 8 \times 1000$
$= \$285.70$

Question 27 (b) (i)

Sample answer:

$180° + 58° + 74° = 312°$

Question 27 (b) (ii)

Sample answer:

$RP^2 = 2.7^2 + 1.8^2 - 2 \times 2.7 \times 1.8 \times \cos 74°$
$RP^2 \doteqdot 7.850\ 804\ 901$
$RP \doteqdot 2.8$ km (to one decimal place)

Question 27 (b) (iii)

Sample answer:

$$A = \frac{1}{2} \times 1.8 \times 2.7 \times \sin 74°$$
$$\fallingdotseq 2.335\,865\,921$$
$$= 2.3 \text{ km}^2 \text{ (to one decimal place)}$$

Question 27 (c)

Sample answer:

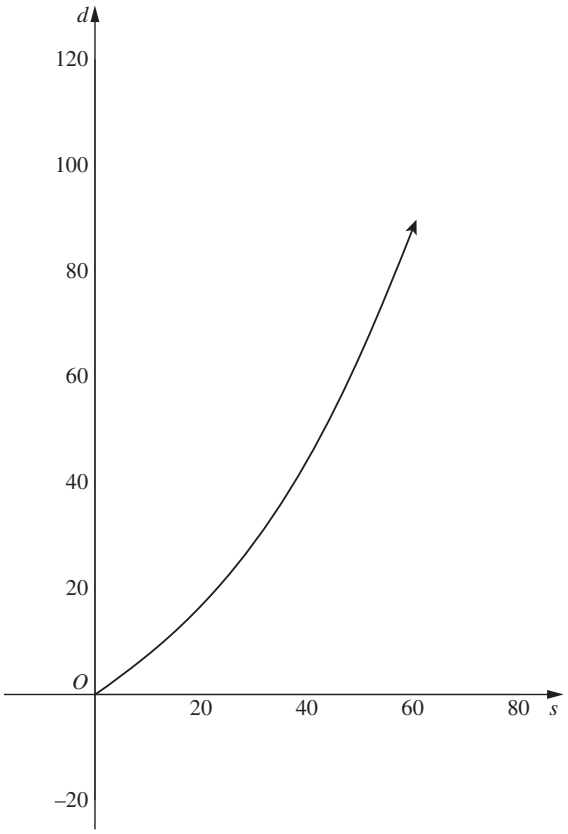
Mary has the better chance of winning: 0.02 is greater than 0.0199

$$\text{Mary } P(\text{win}) = \frac{2}{100} = 0.02$$

$$\text{Jane } P(\text{win}) = 1 - \left(\frac{99}{100}\right)^2$$
$$= 0.0199$$

Question 28 (a) (i)

Sample answer:



Question 28 (a) (ii)

Sample answer:

For 40 km/h stopping distance is 44 m from graph.

$d = 0.01 \times 70^2 + 0.7 \times 70$
$= 98$ m

Difference: 98 – 44 = 54 m

Question 28 (b) (i)

Sample answer:

Positive correlation

Question 28 (b) (ii)

Sample answer:

$$m = \frac{4.7 - 1.2}{55 - 40} = \frac{3.5}{15} = \frac{7}{30} = 0.23 \text{ (to 2 decimal places)}$$

Using $M = mH + b$
Substitute $H = 45$ and $M = 2.3$ and $m = 0.23$

$$2.3 = 45 \times 0.23 + b$$
$$b = -8.05$$

So equation is $M = 0.23H - 8.05$

Question 28 (c)

Sample answer:

$$h = kd^2$$
$$1.6 = k \times 4.5^2$$
$$k = \frac{1.6}{4.5^2}$$
$$= 0.079\ldots$$
$$h = 0.079d^2$$
$$= 0.079 \times 15^2$$

17.8 m (to 1 decimal place)

Question 28 (d)

Sample answer:

	1	**2**	**3**	**4**	**5**	**6**
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

Differences	*Probabilities*	*Expected frequencies*
0	$\frac{6}{36}$	3
1	$\frac{10}{36}$	5
2	$\frac{8}{36}$	4
3	$\frac{6}{36}$	3
4	$\frac{4}{36}$	2
5	$\frac{2}{36}$	1

Difference from expected frequency	
Experiment 1	*Experiment 2*
0	1
2	1
2	1
1	0
1	0
2	1
8	4

$\therefore$ Experiment 2 is closer to the values he would expect.

Yes, Juan is correct.