

B O A R D O F S T U D I E S
NEW SOUTH WALES

2010 HSC General Mathematics Sample Answers

This document contains ‘sample answers’, or, in the case of some questions, ‘answers could 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 answers or responses. As they are part of the examination committee’s ‘working document’, they may contain typographical errors, omissions, or only some of the possible correct answers.

Section II

Question 23 (a)

Sample answer:

$$\begin{aligned} & 1586.70 \times 52 \times 1.035 \\ & = 85\,396.194 \\ & = \$85\,396 \text{ (correct to the nearest dollar)} \end{aligned}$$

Question 23 (b) (i)

Sample answer:

is a shower (recess).

Question 23 (b) (ii)

Sample answer:

5000 or 5000 mm, 5 m

Question 23 (b) (iii)

Sample answer:

$$\begin{aligned} A &= 5 \times 8 + 2 \times 3 = 46 \text{ m}^2 \\ \text{OR} \\ A &= 5 \times 10 - 2 \times 2 = 46 \text{ m}^2 \end{aligned}$$

Question 23 (c) (i)

Sample answer:

$$5 + 15 + 10 + 3 + 1 = 34$$

Question 23 (c) (ii)

Sample answer:

$$\frac{5 + 10}{34} = \frac{15}{34}$$

Question 23 (d) (i)*Sample answer:*

$$\begin{aligned} X &= 590 - (175 + 45 + 10 + 15 + 90 + 40 + 30 + 70 + 50 + 40) \\ &= 590 - 565 \\ &= 25 \\ \therefore \$25 \end{aligned}$$

Question 23 (d) (ii)*Sample answer:*

$$3 \times 40 + 3 \times 40 = 240$$

He has put aside \$240 to pay the bill.

Question 23 (d) (iii)*Sample answer:*

Already saved: \$240
Two weeks additional savings: \$160
Total saving: \$240 + \$160 = \$400

$$\$620 - \$400 = \$220 \text{ short}$$

Must show reallocation of funds which total \$220. [Please note: generating extra income from another job or loan or moving home is not acceptable.]

Question 24 (a) (i)*Sample answer:*

$$\begin{aligned} 4(y + 2) - 3(y + 1) &= -3 \\ 4y + 8 - 3y - 3 &= -3 \end{aligned}$$

Question 24 (a) (ii)*Sample answer:*

$$\begin{aligned} 4y + 8 - 3y - 3 &= -3 \\ y + 5 &= -3 \\ y &= -8 \end{aligned}$$

Question 24 (b)*Sample answer:*

$$x = 4$$

And $x = 4$ is break even point

Question 24 (c) (i)*Sample answer:*

$$\begin{aligned} z &= \frac{115 - 100}{10} \\ &= 1.5 \end{aligned}$$

Question 24 (c) (ii)*Sample answer:*

$$100$$

Question 24 (c) (iii)*Sample answer:*

$$68\% + 13\frac{1}{2}\% = 81\frac{1}{2}\%$$

OR

$$47\frac{1}{2}\% + 34\% = 81\frac{1}{2}\%$$

Question 24 (d) (i)*Sample answer:*

$$\begin{aligned} \angle DBA &= \tan^{-1} \left(\frac{168}{126} \right) = 53^\circ 7' 48.37'' \\ &= 53^\circ 8' \end{aligned}$$

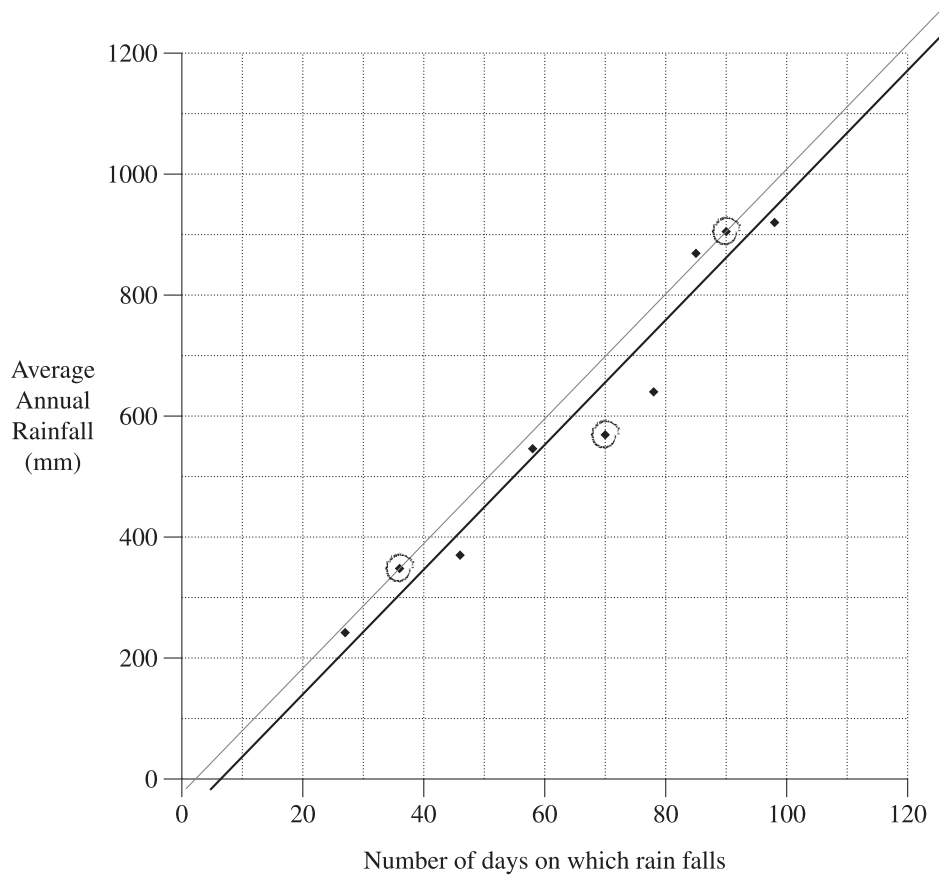
\therefore Since $\angle DBA$ is alternate to the angle of depression, the angle of depression is $53^\circ 8'$.

Question 24 (d) (ii)*Sample answer:*

$$\tan 28^\circ = \frac{168}{AC}$$

$$AC = \frac{168}{\tan 28^\circ}$$
$$= 315.96$$

$$\therefore BC = 315.96 - 126$$
$$= 189.96$$
$$= 190 \text{ m (to the nearest metre)}$$

Question 25 (a) (i)*Sample answer:*

Question 25 (a) (ii)*Sample answer:*

1160 mm

Question 25 (b)*Sample answer:*

$$\begin{aligned} \$670.49 \times 48 &= \$32\,183.52 \\ \text{Interest} &= \$32\,183.52 - \$28\,000 \\ &= \$4183.52 \end{aligned}$$

Question 25 (c) (i)*Sample answer:*

$$\text{Angle difference} = 15^\circ - 1^\circ = 14^\circ$$

$$\begin{aligned} \text{Distance} &= 14 \times 60 \\ &= 840 \text{ M} \end{aligned}$$

$$\begin{aligned} t &= \frac{d}{s} = \frac{840}{15} \\ &= 56 \text{ hours} \end{aligned}$$

Question 25 (c) (ii)*Sample answer:*

$$\begin{aligned} \text{Angle difference} &= 151 + 149 \\ &= 300 \end{aligned}$$

$$\begin{aligned} \text{Time difference} &= \frac{300}{15} \\ &= 20 \text{ hours} \end{aligned}$$

7pm Friday – 20 hours

= 11 pm Thursday

 \therefore Ring at 11 pm Thursday

Question 25 (d)*Sample answer:*

$$A = 600 \left(1 + \frac{0.06}{12} \right)^{36}$$
$$= \$718.01$$

$$A = 150 \left(\frac{(1+r)^n - 1}{r} \right)$$
$$= 150 \left(\frac{\left(1 + \frac{0.06}{12} \right)^{36} - 1}{\frac{0.06}{12}} \right)$$
$$= 150 \left(\frac{(1.005)^{36} - 1}{0.005} \right)$$
$$= 5900.42$$

$$\text{Saved} = \$5900.42 + 718.01$$
$$= \$6618.43$$

\therefore No, he does not have enough
Short $8000 - 6618.43 = \$1381.57$

Question 26 (a) (i)*Sample answer:*

$$10 \times 10 \times 26 \times 26 \times 10 \times 10$$
$$= 6\,760\,000$$

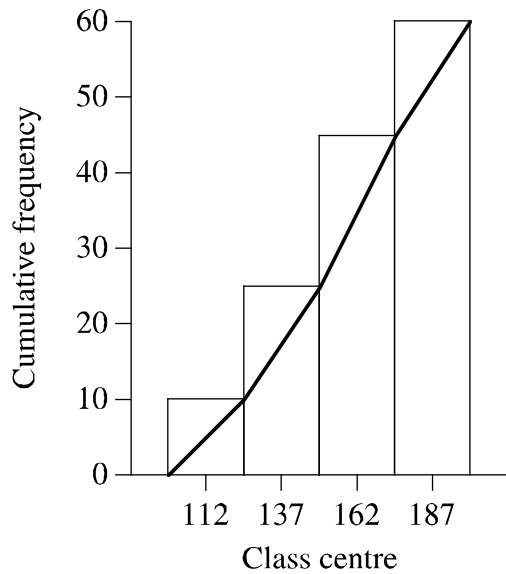
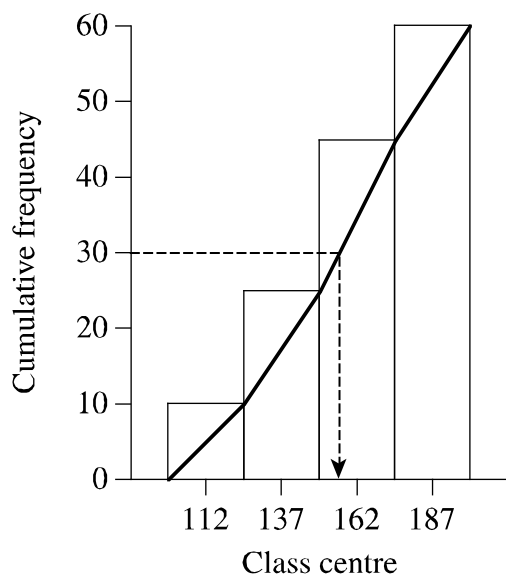
Question 26 (a) (ii)*Sample answer:*

$$10^4 = 10\,000$$

$$\text{Probability} = \frac{2}{10\,000} = \frac{1}{5000}$$

Question 26 (b) (i)*Sample answer:*

15

Question 26 (b) (ii)*Sample answer:***Question 26 (b) (iii)***Sample answer:*

155 or 156

Question 26 (b) (iv)**Sample answer:**

Due to an increase in the median there will be more traffic passing the school. Possible solution is traffic lights should be installed.

Question 26 (c)**Sample answer:**

$$\frac{1}{5} \times 10 + \frac{1}{2} \times 3 - \frac{3}{10} \times 8 - \$2 = -\$0.90$$

\therefore His financial expectation is a loss of 90 cents.

Question 26 (d)**Sample answer:**

$$\cos C = \frac{50^2 + 40^2 - 83^2}{2 \times 50 \times 40}$$

$$= -0.697\ 25$$

$$C = 134.2067854^\circ$$

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 50 \times 40 \times \sin 134.2067854^\circ$$

$$= 716.828\ 039$$

$$= 717\ \text{m}^2 \text{ (nearest square metre)}$$

Question 27 (a)**Sample answer:**

$$\frac{4x^2}{3y} \div \frac{xy}{5} = \frac{4x^2}{3y} \times \frac{5}{xy}$$

$$= \frac{20x^2}{3xy^2}$$

$$= \frac{20x}{3y^2}$$

Question 27 (b) (i)*Sample answer:*

$$50\% \text{ of } 1750 = 875$$

Question 27 (b) (ii)*Sample answer:*

$$25\% \text{ is } 875$$

$$\therefore 875 \times 4 = 3500$$

Question 27 (b) (iii)*Sample answer:*

There is a greater proportion of younger children in 2010 than in 2000. That is the median has changed from 12 to 6.

OR

In 2000, 25% of the children were aged between 0–8, ie $Q_1 = 8$, whereas in 2010, 25% of the children were aged between 0–2, ie $Q_1 = 2$.

OR

In 2000, the distribution is negatively skewed, whereas in 2010 it is positively skewed.

Question 27 (b) (iv)*Sample answer:*

More primary schools will need to be built.

Question 27 (c) (i)*Sample answer:*

\$3000

Question 27 (c) (ii)*Sample answer:*

$$\frac{8000 - 6000}{36\,000 - 30\,000} = \frac{1}{3} \quad \text{OR} \quad \frac{6}{18} = \frac{1}{3}$$

Question 27 (c) (iii)*Sample answer:* $\frac{1}{3}$ of a dollar

OR

33 cents

Question 27 (c) (iv)*Sample answer:*

$$T = 3000 + \frac{1}{3}(I - 21\,000)$$

OR

$$T = \frac{1}{3}I - 4000$$

Question 28 (a) (i)*Sample answer:*

$$\$1588 - \$1573 = \$15$$

Repayments have decreased by \$15.

Question 28 (a) (ii)*Sample answer:*

$$\frac{30}{100} \times 6500 = \$1950$$

$$1942 + 7 \times 6.47 = \$1987.29$$

 \therefore The bank would not have approved the loan as Xiang is \$37.29 short per month.**Question 28 (a) (iii)***Sample answer:*

1. More repayments were made early in Jack's loan before 12 years OR
Larger repayments were made early in Jack's loan before 12 years
2. The interest rate may have increased after 12 years and the repayments remained the same
3. Jack could have taken out a loan with a lower interest rate.

Question 28 (b) (i)*Sample answer:*

$$6 \times 4 \times 3 = 72$$

Question 28 (b) (ii)*Sample answer:*

$$72 \times 2\pi \times 5 \times 9 = 20\,357.5 \text{ cm}^2$$

Question 28 (b) (iii)*Sample answer:*

$$d = 20 \quad r = 10$$

$$h = 10$$

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi \times 100 \times 10 \\ &= 3141.59 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{But original volume} \\ V &= \pi \times 5^2 \times 10 \\ &= 785.398 \text{ cm}^3 \end{aligned}$$

\therefore Monica is not correct.

By doubling the diameter the volume is multiplied by 4.

Question 28 (b) (iv)*Sample answer:*

$$r = 6.3 \text{ cm} \quad h = 12.6 \text{ cm}$$

Monica should recommend a radius of 6.3 cm as this gives the minimum surface area for the can.