BOARD OF STUDIES
NEW SOUTH WALES

2011 General Mathematics HSC Examination 'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document 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:

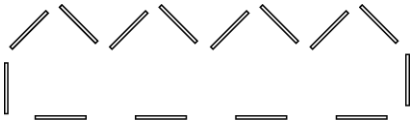
Deductions = \$350 + \$2000 + \$250
= \$2600

Taxable income = \$56 350 – \$2600
= \$53 750

Levy = 1.5% × \$53 750
= \$806.25

Question 23 (b) (i)

Sample answer:



Question 23 (b) (ii)

Sample answer:

$N = 3F + 2$
$= 3 \times 100 + 2$
$= 302$

Question 23 (b) (iii)

Sample answers:

$N = 3F + 2 = 543$
$3F = 541$
$F = 180.33 \ldots$

$\therefore$ No, it will not be possible using exactly 543 sticks.

OR 180 figures can be made with one stick left over.
OR 2 more sticks will be needed to make 181 figures.

Question 23 (c)

Sample answers:

1.340×5000
$= \$6700$

Question 23 (d) (i)

Sample answer:

$$\frac{10\,000}{1\,000} = 10 \text{ m}^3$$

Question 23 (d) (ii)

Sample answer:

$A = \pi \times 0.67 \times 0.75$
$= 1.57865 \text{ m}^2$

$V = Ah$
$10 = 1.57865 \times h$
$h = 6.33 \text{ m}$
OR
633 cm

Question 24 (a) (i)

Sample answer:

900 mm

Question 24 (a) (ii)

Sample answer:

2000 mm × 2000 mm

Question 24 (a) (iii)

Sample answer:

$6485 + 3690 - 2 \times 240$
$=$ 9695 mm
OR
9700 mm by measurement

Question 24 (a) (iv)

Sample answer:

1800 mm

Question 24 (b) (i)

Sample answer:

$72 - (16 + 11 + 8 + 12 + 15)$
$= 10$

Question 24 (b) (ii)

Sample answer:

$\frac{8}{72}$

Question 24 (b) (iii)

Sample answer:

5

Question 24 (c) (i)

Sample answer:

055°

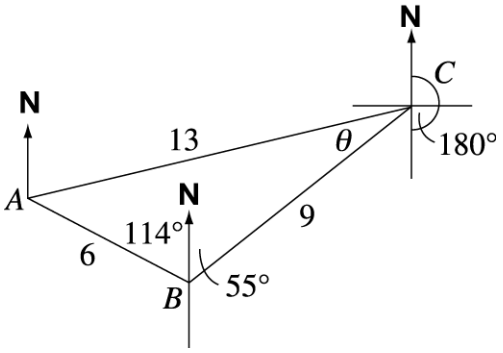
Question 24 (c) (ii)

Sample answer:

$AC^2 = 6^2 + 9^2 - 2(6)(9)\cos 114°$
$= 160.928$
$AC = 13$

Question 24 (c) (iii)

Sample answer:



$$\frac{\sin\theta}{6} = \frac{\sin 114°}{13}$$

$$\sin\theta = \frac{6\sin 114°}{13}$$

$$= 0.4216$$

$$\theta = 25°$$

$\therefore$ Bearing $= 180° + 55° + 25°$
$= 260°$

Question 25 (a) (i)

Sample answer:

Categorical

Question 25 (a) (ii)

Sample answer:

How many text messages did you send last month?

Question 25 (a) (iii)

Sample answers:

5% of each Year of students (Year 7 to Year 12)
OR 5% of students in each postcode

Question 25 (a) (iv)

Sample answers:

All Year 7 to Year 12 students in NSW
OR All high school students in NSW

Question 25 (b) (i)

Sample answer:

Year 12 (has 100%)

Question 25 (b) (ii)

Sample answer:

Year 9: $\frac{55}{70} = 79\%$

Year 10: $\frac{50}{60} = 83\%$

A higher proportion of Year 10 has mobile phones.

Question 25 (b) (iii)

Sample answer:

The percentage of students in each Year group who own mobile phones increases from Year 7 through to Year 12.

Question 25 (c) (i)

Sample answer:

580

Question 25 (c) (ii)

Sample answer:

$\frac{172}{319} = 0.54$

Question 25 (c) (iii)

Sample answer:

$$\frac{113}{271} \times 100 \div 41.69741697\%$$

$$= 42\% \text{ (correct to the nearest per cent)}$$

Question 25 (d) (i)

Sample answer:

Outlier is 71.

Question 25 (d) (ii)

Sample answer:

$$\text{Interquartile range} = 20 - 11$$
$$= 9$$

Question 26 (a) (i)

Sample answer:

$$x = 5$$

Question 26 (a) (ii)

Sample answer:

$$\frac{6}{12} = \frac{1}{2}$$

Question 26 (a) (iii)

Sample answer:

$$\frac{2}{3}$$

Question 26 (a) (iv)

Sample answer:

$$\frac{4}{12} \times 12 + \frac{6}{12} \times 0 - \frac{2}{12} \times 3 = 3.50$$

$3.50 - 5 = -1.50$

Elise expects a loss of \$1.50.

Question 26 (b) (i)

Sample answer:

$5 \times 3^6 = 3645$
Conclusion: $t = 6$ is too small.

Question 26 (b) (ii)

Sample answer:

Try $t = 7$ $\quad 5 \times 3^7 = 10\,935$ $\quad$ too small
Try $t = 8$ $\quad 5 \times 3^8 = 32\,805$ $\quad \therefore$ exceeds 18 000
$\therefore\ t = 8$

Question 26 (c)

Sample answer:

$$\text{Deposit: } 15\% \text{ of } \$20\,000 = \frac{15}{100} \times \$20\,000 = \$3000$$

$$\text{Balance: } \$20\,000 - \$3000 = \$17\,000$$

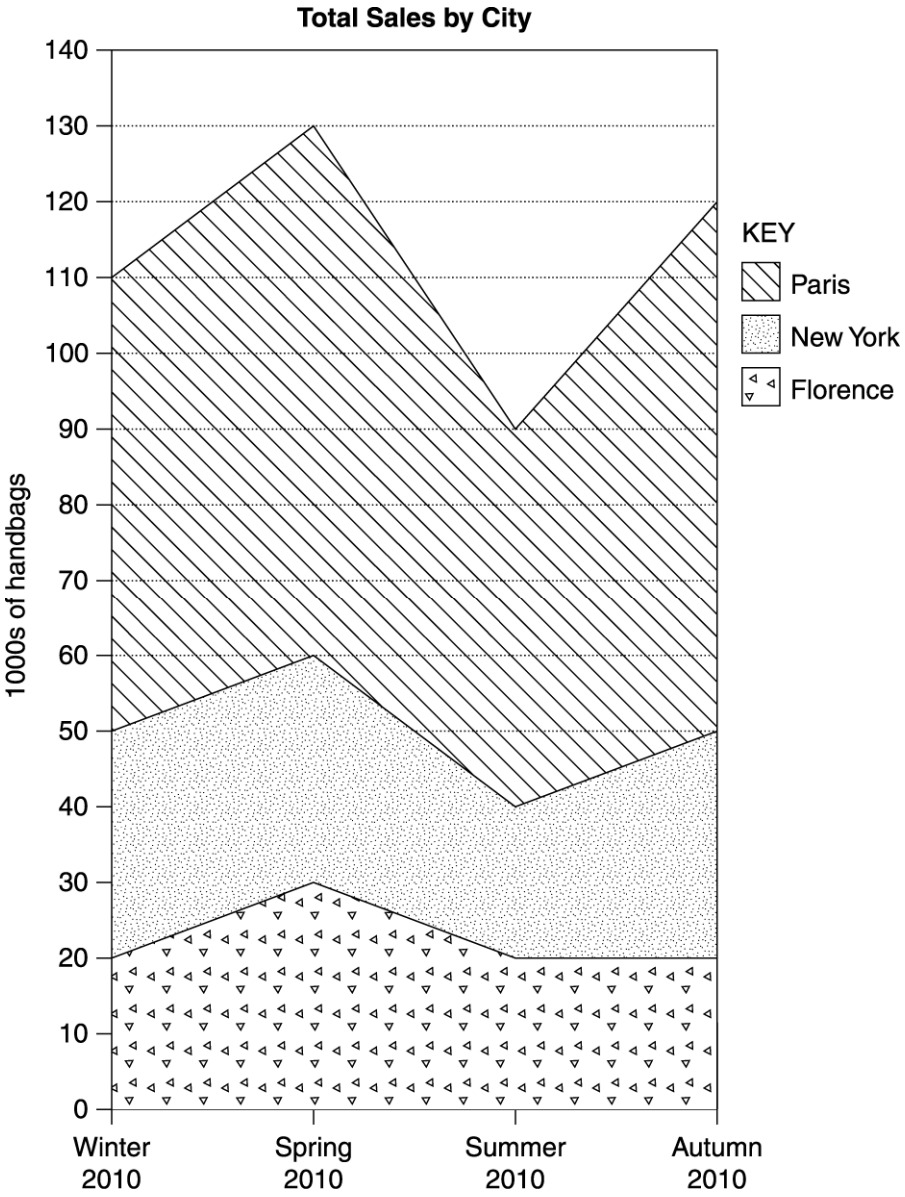
$$\text{Interest: } \$17\,000 \times \frac{19}{100} \times 5 = \$16\,150$$

$$\text{Amount to be repaid: } \$17\,000 + \$16\,150 = \$33\,150$$

$$\text{Repayment: } \frac{\$33\,150}{5 \times 12} = \$552.50$$

Question 27 (a)

Sample answer:



Question 27 (b) (i)

Sample answer:

$$\text{Distance} = \frac{91}{360} \times 2\pi \times 6400 \text{ km}$$
$$= 10\,164.8 \text{ km}$$
$$= 10\,165 \text{ km}$$

Question 27 (b) (ii)

Sample answer:

(4°S, 152°E)

Question 27 (c) (i)

Sample answer:

$$\frac{400 - 500}{50} = -2$$

Question 27 (c) (ii)

Sample answers:

No, it is not correct. Both z-scores are -2.
OR
Both brands are 2 standard deviations below the mean.

Question 27 (d)

Sample answer:

Josephine: $A = 50\,000(1.06)^{15}$
$= 119\,827.9097$
$= 119\,827.91$ (to the nearest cent)

Gain $= \$119\,827.91 - \$50\,000$
$= \$69\,827.91$

Emma: $A = \dfrac{500\left[(1.005)^{180} - 1\right]}{0.005}$
$= 145\,409.36$

Gain $= \$145\,409.36 - 500 \times 12 \times 20$
$= \$55\,409.36$

$\therefore$ Josephine will have the better financial gain.

Question 28 (a) (i)

Sample answer:

$$P = \frac{a}{V}$$

Question 28 (a) (ii)

Sample answer:

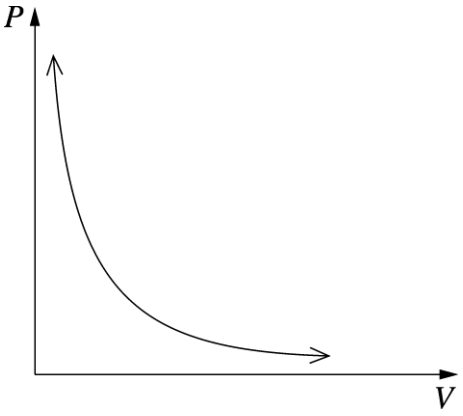
$$P = \frac{a}{V} \qquad P = \frac{6}{V}$$

$$3 = \frac{a}{2} \qquad P = \frac{6}{4}$$

$$a = 6 \qquad = 1.5$$

Question 28 (a) (iii)

Sample answer:



Question 28 (b) (i)

Sample answer:

$$\text{m} = \frac{60\,000}{-15} = -4000$$

Question 28 (b) (ii)

Sample answers:

Rate of depreciation each year
OR Amount the tractor reduces in value each year

Question 28 (b) (iii)

Sample answer:

$V_0 = 60\ 000 \qquad D = 4000 \qquad S = V_0 - Dn$

$S = 60\ 000 - 4000n$

OR $y = mx + b$

$S = -4000n + 60\ 000$

Question 28 (b) (iv)

Sample answer:

$n < 0$ and $n > 15$

Time period cannot be negative.
After 15 years, the tractor has no value, ie value cannot be negative.

Question 28 (b) (v)

Sample answer:

$S = V_0 (1 - r)^{14}$

$= 60\ 000(1 - 0.20)^{14}$

$= 2638.827907$

= \$2638.83 (to the nearest cent)

Question 28 (b) (vi)

Sample answer:

S is decreasing and $S > 0$.

OR Value of the tractor will always be greater than zero.