

$$\begin{aligned} \textcircled{1} \quad m_{AB} &= \frac{y_2 - y_1}{x_2 - x_1} \quad \begin{matrix} (3, -7) \\ (-5, 3) \end{matrix} \\ &= \frac{3 - (-7)}{-5 - 3} \\ &= \frac{10}{-8} \\ &= \underline{\underline{-\frac{5}{4}}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad \frac{2}{5} \text{ of } 3\frac{1}{2} + \frac{4}{5} \\ &= \frac{2}{5} \times 3\frac{1}{2} + \frac{4}{5} \\ &= \frac{2}{5} \times \frac{7}{2} + \frac{4}{5} \\ &= \frac{14}{10} + \frac{4}{5} \\ &= \frac{70 + 40}{50} = \frac{110}{50} = \frac{11}{5} = \underline{\underline{2\frac{1}{5}}} \end{aligned}$$

$\textcircled{3} \quad A(-2, -3) \quad B(4, 9)$

$$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - (-3)}{4 - (-2)} = \frac{12}{6} = \underline{\underline{2}}$$

$$\begin{aligned} y - b &= m(x - a) & \text{pt}(4, 9) \\ y - 9 &= 2(x - 4) & m = 2 \\ y - 9 &= 2x - 8 \\ y &= \underline{\underline{2x + 1}} \end{aligned}$$

- $\textcircled{4} \quad 37, 41, 43, 47, 56, 58, 59, 61, 66, 68, 70, 75$

i) median (Q_2) = 58.5

ii) $Q_1 = \frac{43 + 47}{2} = \frac{90}{2} = 45$
 $Q_3 = 67$

$$\text{SIQR} = \frac{Q_3 - Q_1}{2} = \frac{67 - 45}{2} = \frac{22}{2} = \underline{\underline{11}}$$

b)

median	58.5	SIQR	11
	67		7

- In general the average marks improved from October to December
- The marks were more consistent in December.

$$\begin{aligned} \textcircled{5} \quad 112.5\% \text{ of } x &= 450 \\ \frac{11}{8} \text{ of } x &= 450 \\ \frac{9}{8} x &= 450 \\ 9x &= 3600 \\ x &= 400 \end{aligned}$$

non Calc \therefore Use $100\% = 1$
 $12.5\% = \frac{1}{8}$

\therefore Standard jar = 400g.

$$\begin{aligned} \textcircled{6} \quad \vec{RP} &= \vec{RS} + \vec{ST} + \vec{TP} \\ &= -g - f + h \\ &= \underline{\underline{h - f - g}} \end{aligned}$$

- ⑦ $y = (x+2)^2 - 16$
 a) \therefore Min TP @ $(-2, -16)$ So $P = \underline{(-2, -16)}$
 b) $P_x \rightarrow R_x$ is $-2 \rightarrow 2 = 4$ units so $R_x \rightarrow Q_x$ also 4 units
 $2+4=6 \therefore \underline{Q(6, -16)}$
 c) $Q_x \rightarrow S_x$ is 8 units $\therefore 6+8=14$ $\underline{S(14, -16)}$
 So $\underline{y = (x-14)^2 - 16}$

⑧ $\frac{3}{m} + \frac{4}{m+1}$
 $= \frac{3(m+1) + 4m}{m(m+1)}$
 $= \frac{3m+3+4m}{m(m+1)}$
 $= \frac{7m+3}{m(m+1)}$

⑨ $a = \text{amplitude} = \underline{4}$
 $b = \frac{360}{120} = \underline{3}$

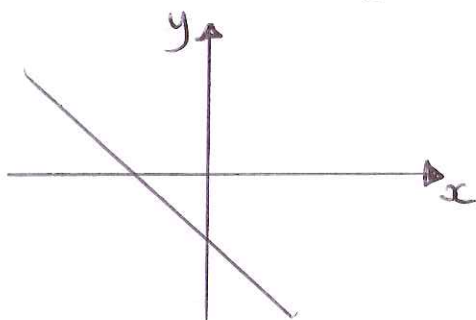
⑩ $2^0 + 3^{-1}$
 $= 1 + \frac{1}{3}$
 $= \underline{\underline{1\frac{1}{3}}}$ $\left[\frac{4}{3} \right]$

⑪ $\sqrt{12} + 5\sqrt{3} - \sqrt{27}$
 $= \sqrt{4\sqrt{3}} + 5\sqrt{3} - \sqrt{9\sqrt{3}}$
 $= 2\sqrt{3} + 5\sqrt{3} - 3\sqrt{3}$
 $= \underline{\underline{4\sqrt{3}}}$

⑫ $A_{\text{circle}} = \pi r^2$
 $= \pi \times \left(\frac{5}{\pi}\right)^2$
 $= \pi \times \frac{25}{\pi^2}$
 $= \frac{25\pi}{\pi^2}$
 $= \underline{\underline{\frac{25}{\pi}}}$ proved.

$C = \pi d$
 $\pi d = 10$
 $d = \frac{10}{\pi} \therefore r = \frac{10}{\pi} \div 2$
 $= \frac{10}{\pi} \times \frac{1}{2}$
 $= \frac{10}{2\pi} = \underline{\underline{\frac{5}{\pi}}}$

- ⑬ $y = ax + b$ $a < 0$ means $y = -x \therefore$ -ve gradient
 $b < 0$ means $-b \therefore$ y-intercept below x axis



Paper 2

HSoG NS Paper D Solutions

① $153100 \times 1.025^{3/2} = 154048.03 = \underline{\underline{\pounds 154000}}$

② i) $\bar{x} = \frac{99}{6} = \underline{16.5}$

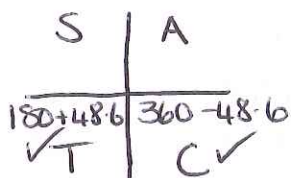
(ii) x	$x - \bar{x}$	$(x - \bar{x})^2$
15	-1.5	2.25
18	1.5	2.25
14	-2.5	6.25
17	0.5	0.25
16	-0.5	0.25
19	2.5	6.25
		$\Sigma = \underline{17.5}$

$sd = \sqrt{\frac{17.5}{5}}$
 $= \underline{1.87}$

b) $\bar{x} = 16.5 + 4$
 $= \underline{20.5}$

$sd = \underline{1.87}$

③ $4 \sin x + 1 = -2$
 $4 \sin x = -3$
 $\sin x = \frac{-3}{4}$
 $x = \sin^{-1}\left(\frac{3}{4}\right)$
 $[x = 48.6^\circ]$
 $\underline{\underline{x = 228.6^\circ, 311.4^\circ}}$



④ a) $14a + 4c = 55$ (x3)
 b) $13a + 6c = 54.5$ (x-2)

$42a + 12c = 165$
 $-26a - 12c = 109$

 $16a = 56$
 $a = 3.5$

sub a = 3.5 into equ (a).

$14(3.5) + 4c = 55$
 $49 + 4c = 55$
 $4c = 6$
 $c = 1.5$

\therefore adult costs $\pounds 3.50$
child costs $\pounds 1.50$

⑤ a) $x = -3$

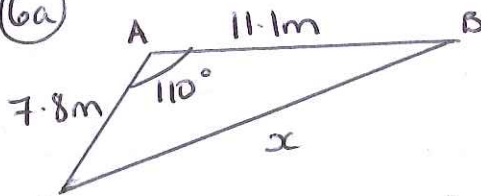
b) $y = (x+3)^2 - 4$

c) C is y-intercept $\therefore x = 0$

$y = (0+3)^2 - 4$
 $y = 3^2 - 4$
 $y = \underline{5}$

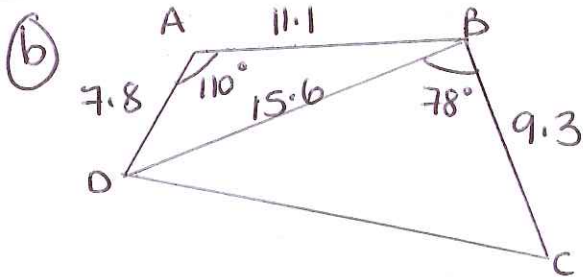
C(0,5)

⑥ a)



All 3 sides involved so Cosine rule!

$a^2 = b^2 + d^2 - (2bd \cos A)$
 $x^2 = 7.8^2 + 11.1^2 - (2 \times 7.8 \times 11.1 \times \cos 110^\circ)$
 $x^2 = 184.05 - (-59.224)$
 $x^2 = 243.274$
 $x = \sqrt{243.274}$
 $x = \underline{15.6} \quad \therefore BD = \underline{15.6m}$



$$A_1 = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} bd \sin A$$

$$= \frac{1}{2} \times 7.8 \times 11.1 \times \sin 110^\circ$$

$$= \underline{40.68 m^2}$$

$$A_2 = \frac{1}{2} ab \sin C$$

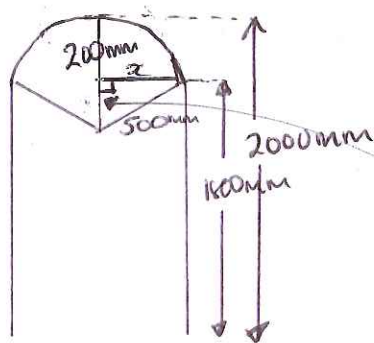
$$= \frac{1}{2} cd \sin B$$

$$= \frac{1}{2} \times 15.6 \times 9.3 \times \sin 78^\circ$$

$$= \underline{70.95 m^2}$$

$$\text{Total Area} = 40.68 + 70.95$$

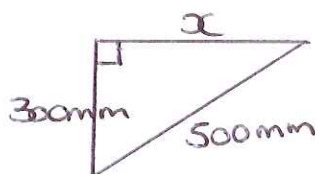
$$= \underline{111.63 m^2}$$



$$r = 500 \text{ mm}$$

$$2000 - 1800 = 200 \text{ mm}$$

$$500 - 200 = 300 \text{ mm}$$



$$x^2 = 500^2 - 300^2$$

$$x^2 = 160000$$

$$x = \sqrt{160000}$$

$$x = \underline{400}$$

$$\therefore \text{Width of doorway} = 400 \times 2 = 800 \text{ mm}$$

(8)

$$2x^2 - kx + 2 = 0$$

$$a = 2$$

$$b = -k$$

$$c = 2$$

$$\text{For equal roots } b^2 - 4ac = 0 \therefore$$

$$b^2 - 4ac = 0$$

$$(-k)^2 - 4(2)(2) = 0$$

$$k^2 - 16 = 0$$

$$(k - 4)(k + 4) = 0$$

$$\downarrow \quad \downarrow$$

$$\underline{k = 4} \quad \underline{k = -4}$$

(9)

$$V = Ah$$

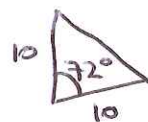
$$= 237.75 \times 8$$

$$= \underline{1902 cm^3}$$

$$A_{\Delta} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 10 \times 10 \times \sin 72^\circ$$

$$= 47.55 cm^2$$



$$\frac{360}{5} = 72$$

$$\therefore A_{\text{pentagon}} = 5 \times 47.55 = \underline{237.75 cm^2}$$

(10)

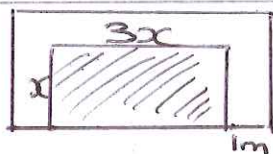
$$\frac{4}{x+3} + \frac{3}{x}$$

$$= \frac{4x + 3(x+3)}{x(x+3)}$$

$$= \frac{4x + 3x + 9}{x(x+3)}$$

$$= \frac{7x + 9}{x(x+3)}$$

(11)



$$\text{Area lawn} = 3x \times x$$

$$= \underline{3x^2}$$

$$\text{Area Path} = A_{\text{Full Rectangle}} - A_{\text{Lawn}}$$

$$= (3x+2)(x+1) - 3x^2$$

$$= 3x^2 + 3x + 2x + 2 - 3x^2$$

$$= \underline{5x + 2}$$

$$\text{Area Lawn} = \text{Area Path}$$

$$3x^2 = 5x + 2$$

$$\Rightarrow \underline{3x^2 - 5x - 2 = 0 \text{ proven}}$$

(b) $3x^2 - 5x - 2 = 0$

$$(3x + 1)(x - 2) = 0$$

$$x = -\frac{1}{3} \quad x = 2$$

$\therefore x = 2$ as $x \neq -ve$

So length of lawn = $3x = 3 \times 2 = \underline{6m}$