

Paper 1

$$\begin{aligned} 1) \quad f(x) &= 5x^3 \\ f(-2) &= 5(-2)^3 \\ &= 5(-8) \\ &= \underline{\underline{-40}} \end{aligned}$$

$$\begin{aligned} 2) \quad \frac{3}{8} \times 1\frac{5}{7} \\ &= \frac{3}{\cancel{8}^2} \times \frac{\cancel{12}^3}{7} \\ &= \underline{\underline{\frac{9}{14}}} \end{aligned}$$

$$\begin{aligned} 3) \quad (x+5)(2x^2-7x-3) \\ &= 2x^3-7x^2-3x+10x^2-35x-15 \\ &= \underline{\underline{2x^3+3x^2-38x-15}} \end{aligned}$$

$$\begin{aligned} 4) \quad \text{Arc} &= \frac{240}{360} \times \pi \times 60 \\ \frac{\cancel{240}}{\cancel{360}} &= \frac{2}{3} \times 60 \times 3.14 \\ &= \frac{2}{3} \times 60 \times 3.14 \\ &= 40 \times 3.14 \\ &= \underline{\underline{125.6 \text{ cm}}} \end{aligned}$$

5)

$$\begin{array}{ccccccccc} 3 & 3 & 4 & 4 & 5 & 6 & 7 & 9 & 10 \\ & \uparrow & & & \uparrow & & & \uparrow & \\ & Q_1 = 3.5 & & & Q_2 & & & Q_3 = 8 & \end{array}$$

$$\begin{aligned} \text{median} &= 5 \\ Q_1 &= 3.5 \\ Q_3 &= 8 \end{aligned}$$

$$IQR = \frac{Q_3 - Q_1}{2} = \frac{8 - 3.5}{2} = \underline{\underline{2.25}}$$

b) on average the temperatures in Endoch are higher

The temperatures were less consistent in Grantford

$$6) (1.5, 14) \quad (3.5, 8)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} & (3.5, 8) \quad m &= -3 \\ &= \frac{8 - 14}{3.5 - 1.5} & y &= mx + c \\ &= \frac{-6}{2} & 8 &= -3(3.5) + c \\ &= -3 & 8 &= -10.5 + c \\ & & c &= 18.5 \\ & & y &= -3x + 18.5 \end{aligned}$$

$$\underline{\underline{F = -3E + 18.5}}$$

$$\begin{aligned}
 b) F &= -3E + 18.5 \\
 &= -3(1.1) + 18.5 \\
 &= \underline{\underline{15.2 \text{ km/L}}}
 \end{aligned}$$

$$\begin{aligned}
 7) A &= \frac{1}{2}h(x+y) \\
 2A &= h(x+y) \\
 \frac{2A}{h} &= x+y \\
 x &= \underline{\underline{\frac{2A}{h} - y}}
 \end{aligned}$$

$$8) a) 7c + 3g = 215 \quad ①$$

$$b) 5c + 4g = 200 \quad ②$$

c)

$$① \times 4 \quad 28c + 12g = 860 \quad ③$$

$$② \times 3 \quad 15c + 12g = 600 \quad ④$$

$$④ - ③ \quad 13c = 260$$

$$c = 20$$

$$① \quad 7c + 3g = 215$$

$$7(20) + 3g = 215$$

$$3g = 215 - 140$$

$$3g = 75$$

$$g = 25$$

$$\underline{\underline{\text{cement} = 20\text{kg} \quad \text{gravel} = 25\text{kg}}}$$

$$9) a) \underline{\underline{x = 4}}$$

$$b) \underline{\underline{a = -4 \quad b = 20}}$$

$$\begin{aligned}
 10) a) \vec{PQ} &= \vec{PR} + \vec{RQ} \\
 &= \begin{pmatrix} 6 \\ -4 \end{pmatrix} + \begin{pmatrix} -1 \\ 8 \end{pmatrix} \\
 &= \underline{\underline{\begin{pmatrix} 5 \\ 4 \end{pmatrix}}}
 \end{aligned}$$

$$\begin{aligned}
 b) \vec{MQ} &= \vec{MR} + \vec{RQ} \\
 &= \frac{1}{2}\vec{PR} + \vec{RQ} \\
 &= \frac{1}{2}\begin{pmatrix} 6 \\ -4 \end{pmatrix} + \begin{pmatrix} -1 \\ 8 \end{pmatrix} \\
 &= \begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -1 \\ 8 \end{pmatrix} \\
 &= \underline{\underline{\begin{pmatrix} 2 \\ 6 \end{pmatrix}}}
 \end{aligned}$$

$$11) \quad 360 \div 5 = 72$$

$$\overset{\wedge}{F_{OB}} = 72 \times 3 \div 2 = 108$$

$$180 - 108 = 72$$

$$\overset{\wedge}{\underline{\underline{OFB = 72 \div 2 = 36^\circ}}}$$

$$\begin{aligned}
 12) \quad & \frac{\sqrt{2}}{\sqrt{40}} \times \frac{\sqrt{40}}{\sqrt{40}} \\
 &= \frac{\sqrt{80}}{40} \\
 &= \frac{\sqrt{16 \times 5}}{40} \\
 &= \frac{4\sqrt{5}}{40} \\
 &= \frac{\sqrt{5}}{10}
 \end{aligned}$$

$$13) \quad \underline{\underline{(135, -3)}}$$

$$\begin{aligned}
 14) \quad & \frac{x}{2} - 1 = \frac{3-x}{5} \\
 & \frac{10x}{2} - 10 = \frac{10(3-x)}{5} \\
 & 5x - 10 = 2(3-x) \\
 & 5x - 10 = 6 - 2x \\
 & 7x - 10 = 6 \\
 & 7x = 16 \\
 & x = \frac{16}{7}
 \end{aligned}$$

$$\begin{aligned}
 15) \text{ a) } \quad & h = 12t - 5t^2 \\
 t=2 \quad & h = 12(2) - 5(2)^2 \\
 &= 24 - 20 \\
 &= \underline{\underline{4 \text{ m}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } \quad & 12t - 5t^2 = -17 \\
 & 5t^2 - 12t - 17 = 0 \\
 & (5t - 17)(t + 1) = 0 \\
 & 5t - 17 = 0 \quad t + 1 = 0 \\
 & 5t = 17 \quad t = -1 \\
 & t = \frac{17}{5} \text{ seconds}
 \end{aligned}$$

Paper 2

$$\begin{aligned} \text{Q1)} \quad & 1.15^3 \times 80000 \\ & = \underline{\underline{121670}} \end{aligned}$$

$$\begin{aligned} \text{Q2)} \quad |\rho| &= \sqrt{(6)^2 + (27)^2 + (-18)^2} \\ &= \underline{\underline{33}} \end{aligned}$$

$$\begin{aligned} \text{Q3)} \quad \text{Area} &= \frac{1}{2} ab \sin C \\ &= \frac{1}{2} \times 45 \times 70 \sin 129 \\ &= \underline{\underline{1224.005 \text{ cm}^2}} \end{aligned}$$

$$\begin{aligned} \text{Q4)} \quad & 0.08 \times 3.6 \times 10^{-6} \\ & = \underline{\underline{2.88 \times 10^{-7} \text{ kg}}} \end{aligned}$$

$$\begin{aligned} \text{Q5)} \quad & A(3, 0, 0) \\ & \underline{\underline{B(3, 3, 8)}} \end{aligned}$$

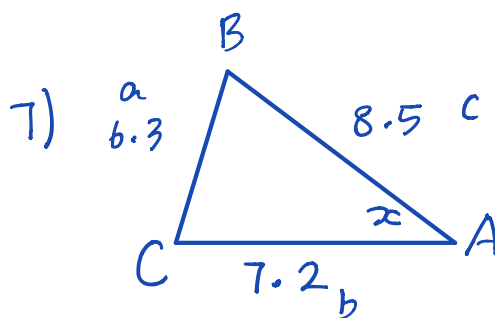
$$\text{Q4)} \quad a = 3 \quad b = 9 \quad c = -2$$

$$x = \frac{-9 \pm \sqrt{(9)^2 - 4(3)(-2)}}{2(3)}$$

$$= \frac{-9 \pm \sqrt{105}}{6}$$

$$= -3.207825128, 0.2078251277$$

$$= \underline{\underline{-3.2}}, \quad \underline{\underline{0.2}}$$



$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$= \frac{7.2^2 + 8.5^2 - 6.3^2}{2 \times 7.2 \times 8.5}$$

$$A = \cos^{-1}(\dots)$$

$$= \underline{\underline{46.4^\circ}}$$

$$Q8) V = V_{\text{hemisphere}} + V_{\text{cylinder}}$$

$$= \frac{1}{2} \left(\frac{4}{3} \pi r^3 \right) + \pi r^2 h$$

$$70-12=58$$

$$= \frac{1}{2} \times \frac{4}{3} \times \pi \times 12^3 + \pi \times 12^2 \times 58$$

$$= 1152\pi + 8352\pi$$

$$= 29857$$

$$= \underline{\underline{29900 \text{ cm}^3}}$$

$$Q9) \begin{array}{l} 102.5\% = 977.85 \\ \div 102.5 \left(\begin{array}{l} 1\% = 9.54 \end{array} \right) \div 102.5 \\ \times 2.5 \left(\begin{array}{l} 2.5\% = \underline{\underline{23.85}} \end{array} \right) \times 2.5 \end{array}$$

$$Q10) x^2 + 10x - 15$$

$$= (x+5)^2 - 15 - 25$$

$$= \underline{\underline{(x+5)^2 - 40}}$$

$$Q11) BC = 1500 - 650 - 600$$

$$= 250 \text{ m}$$

$$650^2 = 422500$$

$$250^2 + 600^2 = 422500$$

$$650^2 = 250^2 + 600^2$$

so, by the converse of Pythagoras the triangle is right angled and B is due east of A

$$12a) S.F = \frac{30}{50}$$

$$\text{Area S.F} = \left(\frac{30}{50} \right)^2$$

$$\text{Area} = \left(\frac{30}{50} \right)^2 \times 2750$$

$$= \underline{\underline{990 \text{ cm}^2}}$$

$$b) \text{Area}_{\text{sector}} = \frac{x}{360} \times \pi r^2$$

$$990 = \frac{x}{360} \times \pi \times 30^2$$

$$x = \frac{990 \times 360}{(\pi \times 30^2)}$$

$$= \underline{\underline{126.05^\circ}}$$

$$13) \quad x_1, y_1, \quad x_2, y_2 \\ (6, 9) \quad (4p, 4p^2)$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{4p^2 - 9}{4p - 6} \\ &= \frac{(2p-3)(2p+3)}{2(2p-3)} \\ &= \frac{2p+3}{2} \end{aligned}$$

$$14) \quad 5\cos x + 2 = 1$$

$$5\cos x = -1$$

$$\cos x = -\frac{1}{5}$$

$$\cos^{-1}(1/5) = 78.5$$

$\sqrt{5}$	A
$\sqrt{1}$	C

$$x = 180 - 78.5^\circ, 180 + 78.5^\circ$$

$$= \underline{\underline{101.5^\circ, 258.5^\circ}}$$

$$15) \quad \frac{4}{x-2} - \frac{3}{x+5}$$

$$\begin{aligned} &= \frac{4(x+5) - 3(x-2)}{(x-2)(x+5)} \\ &= \frac{4x + 20 - 3x + 6}{(x-2)(x+5)} \\ &= \frac{x + 26}{(x-2)(x+5)} \end{aligned}$$

$$16) \quad \frac{a^4 \times 3a}{\sqrt{a}}$$

$$= \frac{3a^5}{a^{1/2}}$$

$$= \underline{\underline{3a^{9/2}}}$$

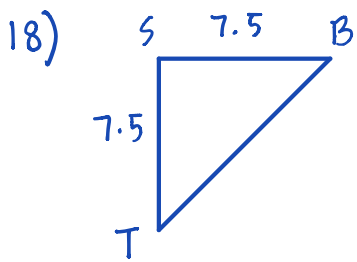
$$17) \quad (\sin x + \cos x)^2$$

$$= (\sin x + \cos x)(\sin x + \cos x)$$

$$= \sin^2 x + \sin x \cos x + \cos x \sin x + \cos^2 x$$

$$\sin^2 x + \cos^2 x = 1$$

$$= \underline{\underline{2\sin x \cos x + 1}}$$



$$TB^2 = 7.5^2 + 7.5^2$$

$$= 112.5$$

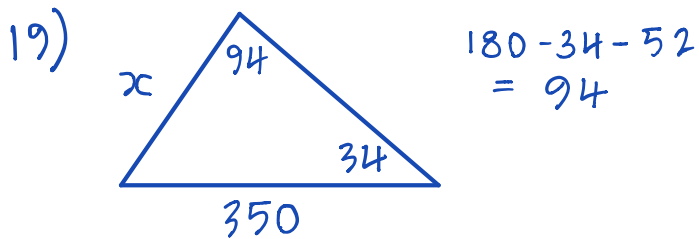
$$TB = \sqrt{112.5}$$

$$= 10.6$$

$$CD = CT + TD$$

$$= 15 + 10.6$$

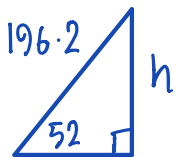
$$= \underline{\underline{25.6 \text{ cm}}}$$



$$\frac{x}{\sin 34} = \frac{350}{\sin 94}$$

$$x = \frac{350 \sin 34}{\sin 94}$$

$$= 196.2$$



$$\frac{h}{\sin 52} = \frac{196.2}{\sin 90}$$

$$h = \frac{196.2 \times \sin 52}{\sin 90}$$

$$= \underline{\underline{154.6 \text{ m}}}$$