

1. 2017 \rightarrow 2020 is 3 years $100 - 2 = 98\% = 0.98$

$$125000 \times 0.98^3 = \underline{\underline{117649}} \text{ tonnes.}$$

2. $C = \pi D = 3.14 \times 14.8 = 46.496 \text{ cm}$

$r = 7.4$

$D = 14.8 \text{ cm}$

major arc $AB = \frac{320}{360} \times 46.496$

$$= \underline{\underline{41.3 \text{ cm}}}$$

3. $r = \begin{pmatrix} 24 \\ -12 \\ 8 \end{pmatrix}$ so $|r| = \sqrt{24^2 + (-12)^2 + 8^2} = \sqrt{784} = \underline{\underline{28 \text{ units}}}$

4. $3x < 6(x-1) - 12$

$$3x < 6x - 6 - 12$$

$$3x < 6x - 18$$

or $3x < 6x - 18$

$$6x - 18 > 3x$$

$$-3x \quad -311$$

$$3x - 18 > 0$$

$$+18 \quad +18$$

$$3x > 18$$

$$\underline{\underline{x > 6}}$$

$$-6x \quad -6x$$

$$-3x < -18$$

(A5)

$$3x > 18$$

$$x > 6$$

5a) $\bar{x} = \frac{120 + 126 + 125 + 131 + 130 + 124}{6} = \frac{756}{6} = \underline{\underline{126}}$

x	$(x - \bar{x})$	$(x - \bar{x})^2$
120	-6	36
126	0	0
125	-1	1
131	5	25
130	4	16
124	-2	4
	<u>0 ✓</u>	<u>82</u>

$$S.D = \sqrt{\frac{82}{5}}$$

$$= \sqrt{16.4}$$

$$= \underline{\underline{4.05}}$$

5b)	Saturday	Sunday
	mean = 126	mean = 117
	S.D = 4.05	S.D = 6.2

So mean of 126 on Saturday was higher than mean on Sunday of 117
 So, on average, more people visited the stalls on Saturday.
 S.D of 4.05 on Saturday was lower than S.D on Sunday of 6.2
 meaning the number of visitors on Saturday was more consistent
 (less spread out)

$$6. \quad f(x) = 5 + 4x$$

$$f(a) = 5 + 4a$$

$$\text{If } f(a) = 73$$

$$\text{then } \begin{array}{r} 5 + 4a = 73 \\ -5 \quad -5 \end{array}$$

$$4a = 68$$

$$\underline{\underline{a = 17}}$$

$$7. \quad V_{\text{sphere}} = \frac{4}{3} \pi r^3 = \frac{4}{3} \times \pi \times 3.2^3 = 137.258$$

$$D = 6.4$$

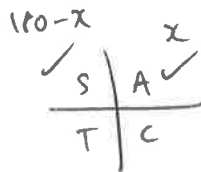
$$r = 3.2$$

$$= \underline{\underline{140 \text{ cm}^3}} \text{ to 2 sig figs.}$$

$$8. \quad \begin{array}{r} 7 \sin x^\circ + 2 = 3 \\ -2 \quad -2 \end{array}$$

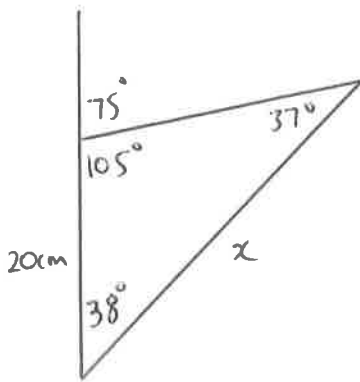
$$7 \sin x^\circ = 1$$

$$\sin x^\circ = \frac{1}{7}$$



$$x = \underline{\underline{8.2^\circ}} \text{ or } \underline{\underline{171.8^\circ}}$$

9.



$$\frac{x}{\sin 105^\circ} = \frac{20}{\sin 37^\circ}$$

$$x = \frac{20 \sin 105^\circ}{\sin 37^\circ} = \underline{\underline{32.1 \text{ cm}}}$$

10.

$$\begin{aligned} \vec{BC} &= \vec{BA} + \vec{AE} + \vec{ED} + \vec{DC} \\ &= -u + (-w) + 2u + \frac{1}{2}w \\ &= \underline{\underline{u - \frac{1}{2}w}} \end{aligned}$$

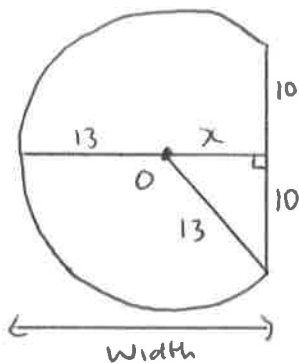
11.

$$85\% = 9.3 \times 10^{11}$$

$$1\% = \frac{9.3 \times 10^{11}}{85} = 1.094117647 \times 10^{10}$$

$$100\% = 100 \times 1.094117647 \times 10^{10} = \underline{\underline{1.09 \times 10^{12}} \text{ (to 2 d.p.)}}$$

12.



$$x^2 = 13^2 - 10^2$$

$$x^2 = 169 - 100$$

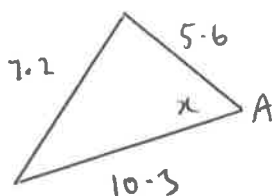
$$x^2 = 69$$

$$x = \sqrt{69}$$

$$x = 8.3 \text{ cm}$$

$$\text{So width} = 13 + 8.3 = \underline{\underline{21.3 \text{ cm}}}$$

13.



Find x:

$$\cos A = \frac{10.3^2 + 5.6^2 - 7.2^2}{2 \times 10.3 \times 5.6}$$

$$\cos A = 0.742$$

$$A = 42.1^\circ$$

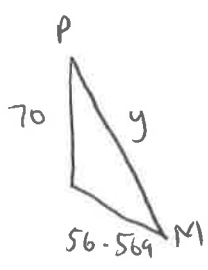
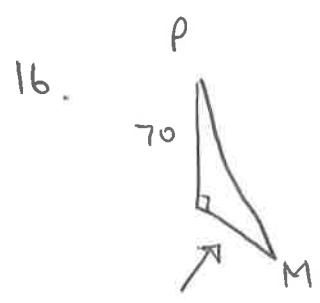
$$\text{So bearing is } 240 + 42.1 = \underline{\underline{282.1^\circ}}$$

14. $2x - 5y = 20$

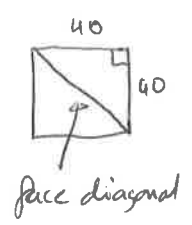
crosses y axis when $x=0 \Rightarrow 2(0) - 5y = 20$
 $-5y = 20$
 $y = -4$

$(0, -4)$

15. $\frac{n}{n^2-4} \div \frac{3}{n-2} = \frac{n}{n^2-4} \times \frac{n-2}{3} = \frac{n}{(n-2)(n+2)} \times \frac{n-2}{3}$
 $= \frac{n(n-2)}{3(n-2)(n+2)} = \frac{n}{3(n+2)}$

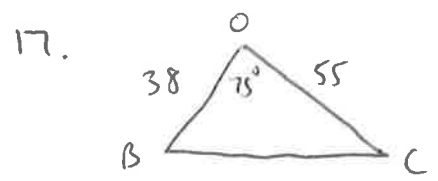


$y^2 = 70^2 + 56.569^2$
 $y^2 = 4900 + 3200$
 $y^2 = 8100$
 $y = \sqrt{8100}$
 $y = 90\text{cm}$



This face diagonal is $\sqrt{40^2 + 40^2}$
 $= \sqrt{3200}$
 $= 56.569\text{cm}$

So $PM = 90\text{cm}$, umbrella is only 85cm long so will fit in diagonally from P to M.



$A_{\Delta} = \frac{1}{2}ab \sin C = \frac{1}{2} \times 38 \times 55 \times \sin 75^\circ$
 $= 1009.4\text{cm}^2$

$A_o = \pi r^2$
 $= \pi \times 30^2$
 $= 2827.4$

$A_{\text{Sector}} = \frac{75}{360} \times 2827.4 = 589.05\text{cm}^2$

Shaded area = $1009.4 - 589.05$
 $= \underline{\underline{420.35\text{cm}^2}}$

$$18. a) \text{ enlargement scale factor} = \frac{24}{16} = 1.5$$

$$\text{Volume scale factor} = 1.5^3 = 3.375$$

$$\text{So volume of larger carton should be } 576 \times 3.375 \\ = 1944 \text{ cm}^3$$

$1944 \neq 1125$ so cartons are not similar.

$$b) \frac{1500}{576} = 2.604$$

$$\sqrt[3]{2.604} = 1.3758$$

$$\text{So depth of new large carton} = 16 \times 1.3758 \\ = \underline{\underline{22.01 \text{ cm.}}}$$