2016 Paper 2 Solutions

(1) $100\% - 8\% = 92\% = 0.92$

$35 \times 0.92^3 = \underline{27.25g}$

(2) 1.5×10^9 grains $\rightarrow$ 12 g

1 grain $\rightarrow \frac{12}{1.5 \times 10^9} = \underline{8 \times 10^{-9} g}$

(3) $V - u$

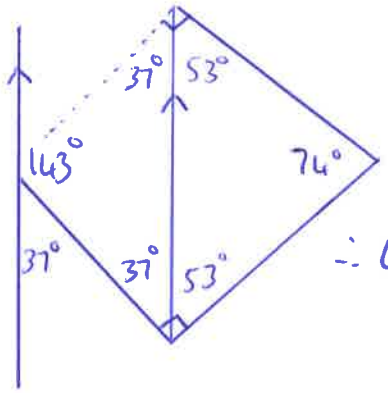
(4) $3x^2 - 48$

$= 3(x^2 - 16)$

$= 3(x^2 - 4^2)$

$= \underline{3(x-4)(x+4)}$

(5)



$\therefore LABC = \underline{74^\circ}$

(6) mean $= \bar{x} = \frac{78}{6} = 13$

x	$(x-\bar{x})$	$(x-\bar{x})^2$
13	0	0
16	3	9
10	-3	9
22	9	81
5	-8	64
12	-1	1
	check 0	164

$S.D = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$

$= \sqrt{\frac{164}{5}}$

$= \underline{5.73}$

b) Sophie waited longer on average $(15 > 13)$

Sophie's wait times were more consistent (less spread out) as her S.D of $4.3 < 5.73$

(7) $V_{\text{large cone}} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \pi \times 16^2 \times 24$

$= 6433.98$

$V_{\text{small cone}} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \pi \times 9^2 \times 13.5$

$= 1145.11$

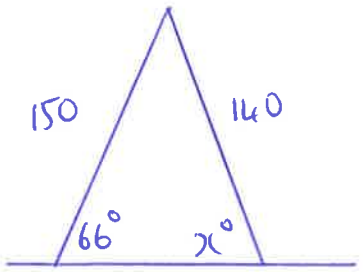
(2)

Volume of carton $= 6433.98 - 1145.11$

$= 5288.87$

$= \underline{5300\ cm^3}$ (to 2 sig figs)

(8)



Use Sine Rule

$\frac{150}{\sin x^\circ} = \frac{140}{\sin 66^\circ}$

$140 \sin x^\circ = 150 \sin 66^\circ$

$\sin x^\circ = \frac{150 \sin 66^\circ}{140} = 0.9787$

$x = \underline{78.18^\circ}$

(9) $x^2 + 8x - 7$

$= (x^2 + 8x + 16) - 16 - 7$

$= \underline{(x+4)^2 - 23}$

(10) $(n^2)^3 \times n^{-10}$

$= n^6 \times n^{-10}$

$= n^{-4}$

$= \underline{\frac{1}{n^4}}$ (with a positive power)

(11) Linear S.F (reduction) $= \frac{60}{100} = 0.6$

Area S.F $= (0.6)^2 = 0.36$

Cost of small picture $= 0.36 \times 13.75 = \underline{£4.95}$

(12) $L = \sqrt{4kt - p}$

$L^2 = 4kt - p$

$+p \qquad +p$

Square both sides to eliminate square root.

$L^2 + p = 4kt$

$4kt = L^2 + p$

$k = \dfrac{L^2+p}{4t}$

(13) $\dfrac{3}{x-2} + \dfrac{5}{x+1}$

$= \dfrac{3(x+1)}{(x-2)(x+1)} + \dfrac{5(x-2)}{(x-2)(x+1)}$

$= \dfrac{3x+3+5x-10}{(x-2)(x+1)}$

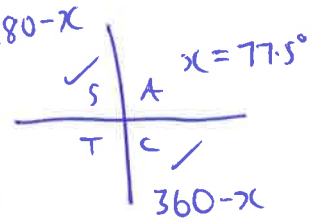
$= \dfrac{8x-7}{(x-2)(x+1)}$

(14) $2\tan x^\circ + 5 = -4$

$-5 \quad -5$

$2\tan x^\circ = -9$

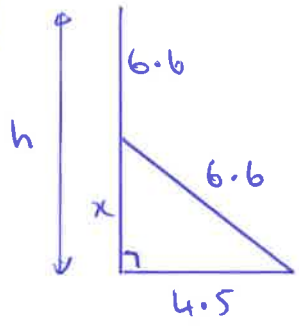
$\tan x^\circ = -\dfrac{9}{2}$



$x_2 = 180 - 77.5 = 102.5^\circ$

$x_4 = 360 - 77.5 = 282.5^\circ$

(15)



$x^2 = 6.6^2 - 4.5^2$

$x^2 = 43.56 - 20.25$

$x^2 = 23.31$

$x = \sqrt{23.31}$

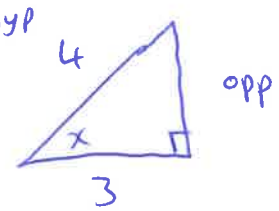
$x = 4.83$ cm

Height of label

$= 4.83 + 6.6$

$= 11.43$ cm

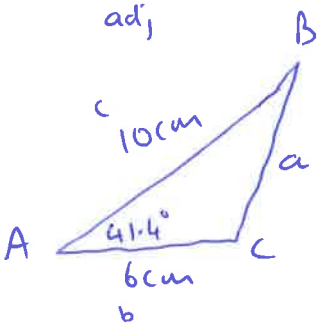
(16)



SOHCAHTOA

$\cos x^\circ = \dfrac{3}{4}$

$x = 41.4^\circ$



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

$a^2 = 6^2 + 10^2 - 2 \times 6 \times 10 \times \cos 41.4^\circ$

$a^2 = 45.9866$

$a = 6.78$

$a = 6.8$ cm (to 1 d.p).