2015 Paper 2 Solutions

(1) $240000 \times 1.028^2 = £253628.16$

$100 + 2.8$
$= 102.8\%$
$= 1.028$

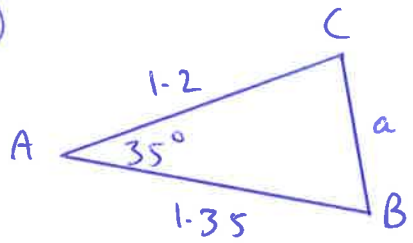
(2) $f(x) = 3x + 2$

$f(a) = 3a + 2$

If $f(a) = 23$

$3a + 2 = 23$
$-2 \quad -2$
$3a = 21$
$a = 7$

(3)



relabel to suit formula from formula sheet.

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

$a^2 = 1.2^2 + 1.35^2 - 2 \times 1.2 \times 1.35 \times \cos 35°$

$a^2 = 0.608$

$a = \sqrt{0.608}$

$a = 0.78$ km

(4) $|u| = \sqrt{6^2 + (-13)^2 + 18^2}$

$= \sqrt{36 + 169 + 324}$

$= \sqrt{529}$

$= 23$

(5) $p = \begin{pmatrix} -5 \\ 3 \end{pmatrix} \quad q = \begin{pmatrix} 4 \\ -5 \end{pmatrix}$

$p + q = \begin{pmatrix} -5 \\ 3 \end{pmatrix} + \begin{pmatrix} 4 \\ -5 \end{pmatrix} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$

(6) a) $V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi \times 6400^3 = 1.098 \times 10^{12} = 1.1 \times 10^{12}$ km^3

b) $1.1 \times 10^{12} \div 2.2 \times 10^{10} = 50$

(7) $\frac{5t}{s} \div \frac{t}{2s^2}$

$= \frac{5t}{s} \times \frac{2s^2}{t}$

$= \frac{10ts^2}{st}$

$= 10s$

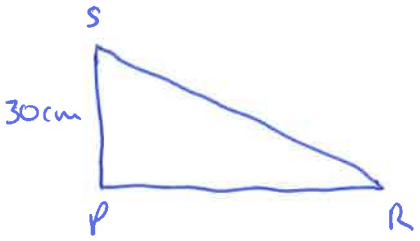
(8) $100\% - 15\% = 85\%$

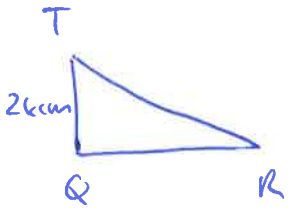
$85\% = 297.50$

$1\% = \frac{297.50}{85} = 3.5$

$100\% = 100 \times 3.5 = £350$

(9)





Area = 400cm²

Find area of PSR:

Linear scale factor (of enlargement) = $\frac{30}{24} = \frac{5}{4} = 1.25$

Area scale factor = $(1.25)^2 = 1.5625$

Area of Δ PSR = $1.5625 \times 400 = 625 cm^2$

$\therefore$ Area of blue section PQTS = $625 - 400$

$= \underline{225 cm^2}$

(10) $\frac{\text{arc length}}{\text{circumference}} = \frac{\text{angle at centre}}{360^\circ}$

$\Rightarrow \frac{28.4}{\pi d} = \frac{65}{360}$ cross multiply (top × bottom = bottom × top)

$\Rightarrow 65\pi d = 28.4 \times 360$ divide both sides by 65π

$d = \frac{28.4 \times 360}{65\pi}$

$d = 50.068$

$\therefore r =$ half of diameter $= \underline{25.03 cm}$

(11)

$360 \div 6 = 60^\circ$

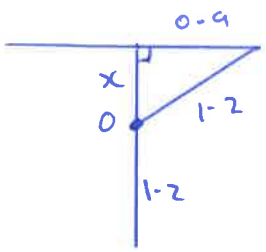
Area = $\frac{1}{2} ab \sin C$

$= \frac{1}{2} \times 20 \times 20 \times \sin 60^\circ$

$= 173.2 cm^2$

$\therefore$ Area of hexagon = $6 \times 173.2 = \underline{1039.23 cm^2}$.

(12)



$x^2 = 1.2^2 - 0.9^2$

$x^2 = 1.44 - 0.81$

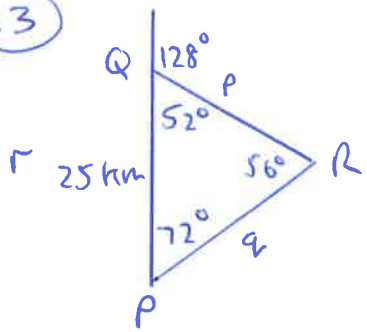
$x^2 = 0.63$

$x = \sqrt{0.63}$

$x = 0.79m$

Total depth of milk = $0.79 + 1.2 = \underline{1.99m}$

(13)



Sine Rule $\frac{r}{\sin R} = \frac{q}{\sin Q}$

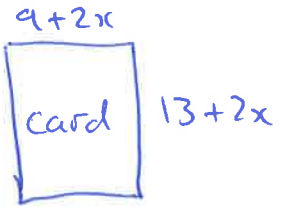
$\Rightarrow \frac{25}{\sin 56^\circ} = \frac{q}{\sin 52^\circ}$

$\Rightarrow q \sin 56^\circ = 25 \sin 52^\circ$

$\Rightarrow q = \frac{25 \sin 52^\circ}{\sin 56^\circ} = \underline{23.76km}$

(14) ai) Length = $13 + 2x$

ii) Area of card = 270



$A = lb$ $\quad (9+2x)(13+2x) = 270$

$117 + 18x + 26x + 4x^2 = 270$

$4x^2 + 44x + 117 - 270 = 0$

$\underline{4x^2 + 44x - 153 = 0}$ as required.

b) Use quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 4$
$b = 44$
$c = -153$

$x = \frac{-44 \pm \sqrt{44^2 - 4 \times 4 \times -153}}{8}$

$x = \frac{-44 \pm \sqrt{4384}}{8}$

$x = \frac{-44 + \sqrt{4384}}{8}$ or $x = \frac{-44 - \sqrt{4384}}{8}$

$x = 2.8$ or $x = -13.8$

Can't get rectangles in real life with negative sides so $\underline{x = 2.8cm}$