Question	Scheme	Mark	Notes
1	$2x\left(x^2-3z\right)+z\left(x^2-3z\right)$ OR $x^2\left(2x+z\right)-3z\left(2x+z\right)$ $\left(2x+z\right)\left(x^2-3z\right)$	2	M1 A1
2	$126=2\times3^2\times7$ $612=2^2\times3^2\times17$ (prime factors of 126 or 612) OR Factor tree 2|126 612 3| 63 306 3| 21 102 7 34 HCF = 18	2	M1 A1
3	$\frac{960\text{ km}}{91\text{ litres}}\times4.55\text{ litres}$ (oe) 48 (km per gallon)	2	M1 A1
4 (a)	0	1	B1
(b)	2	1	B1
5	$\frac{8}{2+7+8}\times748$ (oe) 352 (m) M1 for either of the other two lengths of the triangle	2	M1 A1
6	Shaded area = $4^2-\frac{1}{4}\pi\left(4^2\right)$ (oe, can be implied) awrt 3.43 (cm^2)	2	M1 A1
7	$\frac{360}{24}$ OR $180-\frac{\left(2\times24-4\right)\times90}{24}$ 15	2	M1 A1
8	$\left(100-\frac{8^2}{2}\right)-\left(100-\frac{12^2}{2}\right)$ OR $\left(100-\frac{12^2}{2}\right)-\left(100-\frac{8^2}{2}\right)$ (oe) 40 (Accept –40)	2	M1 A1

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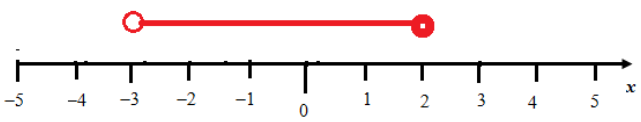
9	$(BC+10)\times 10=(12+8)\times 8$ (oe) BC = 6 (cm)	2	M1 A1
10	(1,5), (5,1), (2, 4), (4,2), (3, 3) OR a 6 x 6 table with 5 possible double rolls identified OR at least 3 correct probability products added All 5 correct probability products added, $5\times\left(\frac{1}{6}\right)^2$ $\frac{5}{36}$, awrt 0.139, 13.9%	3	M1 M1 (DEP) A1
11	$\overrightarrow{OY}=\left(\begin{pmatrix}-4\\2\end{pmatrix}-\begin{pmatrix}-7\\6\end{pmatrix}\right)=\begin{pmatrix}3\\-4\end{pmatrix}$ $\left\lvert\overrightarrow{OY}\right\rvert=\sqrt{"3"^2+"-4"^2}$ Second M mark for the modulus of their $\overrightarrow{OY}$ but not for $\overrightarrow{OX}$ or $\overrightarrow{YX}$ **NB:** Accept working for $\overrightarrow{YO}$ 5 (obtained from correct working) M1M1A0 max if $\overrightarrow{OY}==\begin{pmatrix}-3\\4\end{pmatrix}$ used	3	M1 M1 A1
12	$\angle BCD=45$ or $\angle DBC=45$ and $\angle ACE$=60 **OR** Join AB $\therefore\angle ABC=60$ (Alt. Seg Thm) $\therefore\angle$RBA=75 $\angle ACB=75^{o}$ $\angle$s on straight line and Tangents to a circle have the same length. **OR** $\angle$s on straight line and Isosceles Δs **OR** (From 1st B1: Alternate Segment Thm twice)) **NB:** Accept angles on diagram	3	B1 B1 B1

Question	Scheme	Mark	Notes
13	$4x^2 + 45 = 9x^2$ Condone lack of brackets for M1 only $45 = 5x^2$ (oe) $x = 3$ Accept $x = \pm 3$	3	M1 M1 (DEP) A1
14	$\sqrt{\left(\sqrt{8}\right)^2 + 1^2}$ or 3 (Pythagoras) $\therefore (3)\left(\frac{\sqrt{8}}{\sqrt{\left(\sqrt{8}\right)^2 + 1^2}} + \frac{1}{\sqrt{\left(\sqrt{8}\right)^2 + 1^2}}\right)$ $1 + \sqrt{8}$ **NB:** No working shown scores M0 M0 A0 even if correct answer given.	3	M1 M1 (DEP) A1
15 (a)	3, 6, 9, 12, 15 only	1	B1
(b)	$C = \{6, 12, 18, \ldots, 48\}$ First B mark in (b) can be implied by $(A \cap B) \cap C' = \{3,\ 9,\ 15\}$ $(\text{so} \quad C' = \{3, 9, \ldots, 45\})$ $\therefore (A \cap B) \cap C' = \{3,\ 9,\ 15\}$ **NB:** ft on "(a)" $\text{n}([A \cap B] \cap C') = 3$ (cao)	3	B1 B1 B1
16 (a)	$\begin{pmatrix} -9 & -25 \\ -4 & 26 \end{pmatrix}$	2	B2 (-1eeoo)
(b)	$\begin{pmatrix} -5 & 1 & 12 \\ 0 & -14 & -28 \end{pmatrix}$	2	B2 (-1eeoo)

Question	Scheme	Mark	Notes
17	New $R = \frac{x \times 1.05}{y \times 0.75}$ or $\frac{1.05}{0.75}$ (oe) $= \frac{7}{5}R$ or 1.4 or 140 (oe) $\therefore$ increase $= \frac{\left("\frac{7}{5}"-1\right)R}{R} \times 100$ (oe) 3rd M mark for correct method to convert to required % e.g. $140-100, (1.4-1.0)\times 100,$ etc. 40%	4	M1 A1 M1 (DEP) A1
18	$w(5y-2x) = 2(x+3y)+2(5y-2x)$ (removing denominators correctly) $5yw-2xw = 2x+6y+10y-4x$ (expanding) (**OR** $w(5y-2x) = 2(8y-x)$ (removing denominators) $5yw-2xw = 16y-2x$ (expanding)) $5yw-16y = -2x+2xw$ (collecting terms in y) $y = \frac{2x(w-1)}{(5w-16)}$, $\frac{2xw-2x}{5w-16}$ (oe)	4	M1 M1 (M1) (M1) M1 A1
19 (a)	$\frac{5\times7\times9+2\times6\times9-4\times6\times7}{6\times7\times9}$ (oe, no errors) $\frac{255}{378}$, $\frac{85}{126}$ **NB:** No working seen scores M0 A0	2	M1 A1
(b)	0.6746→0.675 **NB:** ft on 4 figure accuracy of their (a) giving their "3 sf answer"	1	B1 ft
(c)	6.75×10^{-1} (or better)	1	B1 ft

Question	Scheme	Mark	Notes
20 (a)	$1-\frac{4}{t^2}$ (one term correct)	3	M1
	$"1-\frac{4}{t^2}"=0$ (equating their f(t) to 0)		M1 (DEP)
	$t=+2$ (cao)		A1
	$\left("2"+\frac{4}{"2"}\right)-\left(8+\frac{4}{8}\right)$ (oe)	2	M1
	4.5 (metres)		A1
21 (a)	$x+y=550$	1	B1
(b)	$22x+12(y-50)+(12-5)\times 50=8600$ (oe)	1	B1
(c)	$"22x+12"(550-x-50)"+(12-5)\times 50=8600"$ (oe but complete method to solve SEs for x and y with no errors)	3	M1
	NB: c's SEs in (a) and (b) must be linear SEs in x and y with (a) having unit coefs.		A1
	$x=225$		A1
	$y=325$		
22 (a)	$-12<4x$ OR $3x\leq 6$ (oe)	3	M1
	$-3<x$		A1
	$x\leq 2$		A1
	NB: $-3<x\leq 2$ scores A2		
(b)		2	B1 ft
	Open circle at "x=−3" and closed circle at "x=2"		B1 ft
	One single line joining the two circles		

Question		Scheme	Mark	Notes
23	(a)	One term correct $9x^2 - 30x$	2	M1 A1
	(b)	$"9x^2 - 30x" = -25$ $9x^2 - 30x + 25 (= 0)$ $(3x - 5)^2$ (Attempt to factorise c's quadratic) $x = \frac{5}{3}$ OR $1\frac{2}{3}$ OR 1.67	4	M1 A1 M1 A1
24	(a)	$\frac{6}{\sin \angle ABC} = \frac{10}{\sin 50}$ oe $\angle ABC = \sin^{-1}\left(\frac{6 \times \sin 50}{10}\right)$ $\angle ABC = 27.363 \rightarrow \mathbf{27.4}$ awrt	3	M1 M1 (DEP) A1
	(b)	$\frac{AB}{\sin(180 - (50 + "\angle ABC"))} = \frac{10}{\sin 50}$ $AB = \frac{10 \times \sin(180 - (50 + "\angle ABC"))}{\sin 50}$ **(OR** $AB^2 = 6^2 + 10^2 - 2 \times 6 \times 10 \times \cos(180 - (50 + "\angle ABC"))$ $AB = \sqrt{((6^2 + 10^2) - (2 \times 6 \times 10 \times \cos(180 - (50 + "\angle ABC"))))}$ **)** $AB = 12.74 \rightarrow \mathbf{12.7}$ (cm) awrt	3	M1 M1 (DEP) (M1) (M1 (DEP))