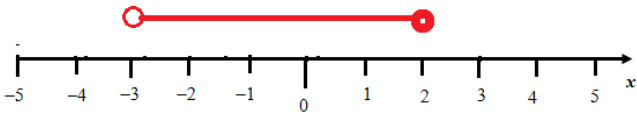


Question	Scheme	Mark	Notes
1	$2x(x^2 - 3z) + z(x^2 - 3z)$ OR $x^2(2x + z) - 3z(2x + z)$ $(2x + z)(x^2 - 3z)$	2	M1 A1
2	$126 = 2 \times 3^2 \times 7$ $612 = 2^2 \times 3^2 \times 17$ (prime factors of 126 or 612) OR Factor tree $\begin{array}{r} 2 \overline{)126} \quad 612 \\ 3 \overline{)63} \quad 306 \\ 3 \overline{)21} \quad 102 \\ \quad 7 \quad 34 \end{array}$ HCF = 18	2	M1 A1
3	$\frac{960 \text{ km}}{91 \text{ litres}} \times 4.55 \text{ litres}$ (oe) 48 (km per gallon)	2	M1 A1
4 (a)	0	1	B1
(b)	2	1	B1
5	$\frac{8}{2+7+8} \times 748$ (oe) 352 (m) M1 for either of the other two lengths of the triangle	2	M1 A1
6	Shaded area = $4^2 - \frac{1}{4}\pi(4^2)$ (oe, can be implied) awrt 3.43 (cm <sup>2</sup> )	2	M1 A1
7	$\frac{360}{24}$ OR $180 - \frac{(2 \times 24 - 4) \times 90}{24}$ 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

Question	Scheme	Mark	Notes
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 A1 (DEP)
11	$\overrightarrow{OY} = \left( \begin{pmatrix} -4 \\ 2 \end{pmatrix} - \begin{pmatrix} -7 \\ 6 \end{pmatrix} \right) = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$  $ \overrightarrow{OY}  = \sqrt{3^2 + (-4)^2}$  Second M mark for the modulus of their $\overrightarrow{OY}$ but not for $\overrightarrow{OX}$ or $\overrightarrow{YX}$ <b>NB:</b> 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 $\angle ACE = 60$ <b>OR</b> Join AB $\therefore \angle ABC = 60$ (Alt. Seg Thm) $\therefore \angle RBA = 75$  $\angle ACB = 75^\circ$  $\angle$ s on straight line and Tangents to a circle have the same length.  <b>OR</b> $\angle$ s on straight line and Isosceles $\Delta$ s <b>OR</b> (From 1 <sup>st</sup> B1: Alternate Segment Thm twice))  <b>NB:</b> 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	$\sqrt{(\sqrt{8})^2 + 1^2}$ or 3 (Pythagoras)  $\therefore (3) \left( \frac{\sqrt{8}}{\sqrt{(\sqrt{8})^2 + 1^2}} + \frac{1}{\sqrt{(\sqrt{8})^2 + 1^2}} \right)$  $1 + \sqrt{8}$  <b>NB:</b> 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  (b) $C = \{6, 12, 18, \dots, 48\}$  First B mark in (b) can be implied by $(A \cap B) \cap C' = \{3, 9, 15\}$ (so $C' = \{3, 9, \dots, 45\}$ )  $\therefore (A \cap B) \cap C' = \{3, 9, 15\}$  <b>NB:</b> ft on "(a)" $n([A \cap B] \cap C') = 3$ (cao)	1  3	B1  B1 B1 B1
16	(a) $\begin{pmatrix} -9 & -25 \\ -4 & 26 \end{pmatrix}$  (b) $\begin{pmatrix} -5 & 1 & 12 \\ 0 & -14 & -28 \end{pmatrix}$	2  2	B2 (-1eeoo)  B2 (-1eeoo)

Question	Scheme	Mark	Notes
17	$\text{New } R = \frac{x \times 1.05}{y \times 0.75} \quad \text{or} \quad \frac{1.05}{0.75} \quad (\text{oe})$ $= \frac{7}{5} R \text{ or } 1.4 \text{ or } 140 \quad (\text{oe})$ $\therefore \text{increase} = \frac{\left(\frac{7}{5} - 1\right) R}{R} \times 100 \quad (\text{oe})$ <p>3<sup>rd</sup> M mark for correct method to convert to required %  e.g. <math>140 - 100, (1.4 - 1.0) \times 100</math>, etc.  40%</p>	4	M1 A1 M1 (DEP) A1
18	$w(5y - 2x) = 2(x + 3y) + 2(5y - 2x)$ <p style="text-align: right;">(removing denominators correctly)</p> $5yw - 2xw = 2x + 6y + 10y - 4x \quad (\text{expanding})$ <p>(OR <math>w(5y - 2x) = 2(8y - x)</math>  (removing denominators)  <math>5yw - 2xw = 16y - 2x \quad (\text{expanding})</math>  )</p> $5yw - 16y = -2x + 2xw \quad (\text{collecting terms in } y)$ $y = \frac{2x(w-1)}{(5w-16)}, \quad \frac{2xw-2x}{5w-16} \quad (\text{oe})$	4	M1 M1 (M1) (M1) M1 A1
19 (a)	$\frac{5 \times 7 \times 9 + 2 \times 6 \times 9 - 4 \times 6 \times 7}{6 \times 7 \times 9} \quad (\text{oe, no errors})$ $\frac{255}{378}, \quad \frac{85}{126}$ <p><b>NB:</b> No working seen scores M0 A0</p>	2	M1 A1
(b)	$0.6746 \rightarrow 0.675$ <b>NB:</b> ft on 4 figure accuracy of their (a) giving their “3 sf answer”	1	B1 ft
(c)	$6.75 \times 10^{-1}$ (or better)	1	B1 ft

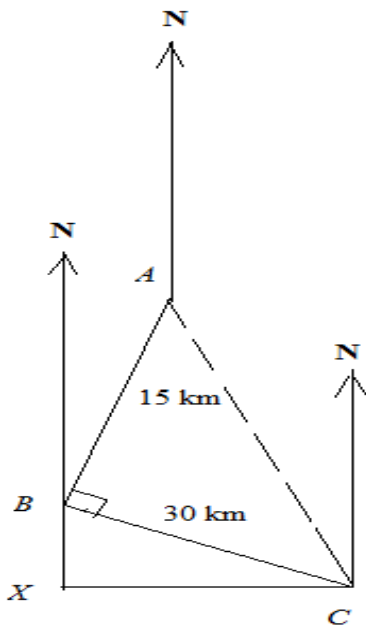
Question	Scheme	Mark	Notes
20 (a)	$1 - \frac{4}{t^2}$ (one term correct)  $"1 - \frac{4}{t^2} = 0"$ (equating their $f(t)$ to 0) $t = +2$ (cao) $\left("2" + \frac{4}{"2"}\right) - \left(8 + \frac{4}{8}\right)$ (oe)  4.5 (metres)	3      2	M1 M1 (DEP) A1      M1 A1
21 (a)	$x + y = 550$	1	B1
(b)	$22x + 12(y - 50) + (12 - 5) \times 50 = 8600$ (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)  <b>NB:</b> c's SEs in (a) and (b) must be linear SEs in $x$ and $y$ with (a) having unit coeffs. $x = 225$  $y = 325$	3	M1 A1 A1
22 (a)	$-12 < 4x$ OR $3x \leq 6$ (oe)  $-3 < x$  $x \leq 2$  <b>NB:</b> $-3 < x \leq 2$ scores A2	3	M1 A1 A1
(b)	  Open circle at " $x = -3$ " and closed circle at " $x = 2$ "  One single line joining the two circles	2	B1 ft B1 ft

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

Question	Scheme	Mark	Notes
25 (a)	$\frac{1}{24} + \frac{1}{48} + \frac{1}{24x}$ of the tank filled in 1 hour, so $\frac{1}{24} + \frac{1}{48} + \frac{1}{24x}$ (oe) <b>seen</b> $\frac{3x+2}{48x}$ or $\frac{1}{16} + \frac{1}{24x}$ (isw after correct answer seen)	2	M1 A1
(b)	<p>) <math>\therefore</math> The 3 taps fill <math>\frac{3x+2}{48x} \times 15</math> <b>OR</b></p> $\left( \frac{1}{16} + \frac{1}{24x} \right) \times 15$	4	M1 M1 M1 A1
	<p>tanks of water in 15 hours</p> <p>So to fill in tank we must have</p> $\frac{3x+2}{2x} \times \frac{15}{24} = 1$ (tank)		(DEP) (DEP)
	$45x + 30 = 48x$ (removing denominators)		
	$\left( \text{OR } \frac{1}{16} + \frac{1}{24x} = \frac{1}{15} \right.$ (M1(DEP)) $24x = 240$ (M1(DEP))		
	$x = 10$		

Question	Scheme	Mark	Notes
26 (a)	<p>Probability pairs (0.3, 0.7), (0.9, 0.1), (0.4, 0.6)</p>	2	B2 (-1 each incorrect pair)
(b)	<p>"0.3×0.1"</p> <p>0.03, 3%</p>	2	M1 A1
(c)	<p>"0.3×0.9" OR "0.7×0.4"</p> <p>"0.3×0.9+0.7×0.4"</p> <p><math>\frac{11}{20}</math>, 0.55, 55%</p>	3	M1 M1 (DEP) A1



Question	Scheme	Mark	Notes
27 (a)	 <p> <math>\angle ABC = 90^\circ</math>  <math>AC = \sqrt{30^2 + 15^2}</math>  <math>AC = 33.54 \rightarrow \text{awrt } 33.5 \text{ (km)}</math> </p>	3	M1 M1 (DEP) A1
(b)	<p>Point X is st <math>BX</math> is perpendicular to <math>CX</math> (see diagram)  <math>\angle BCX = 20^\circ</math></p> <p> <math>\tan \angle BCA = \frac{15}{30} \quad (\angle BCA = 26.565^\circ)</math> </p> <p>Bearing of A from C = <math>270 + (\angle BCA + 20)</math></p> <p><b>(OR</b></p> <p> <math>\tan \angle BAC = \frac{30}{15} \quad (\angle BAC = 63.435^\circ)</math> </p> <p> <math>\therefore</math> bearing of C from A is  <math>200 - 63.435 = 136.565^\circ</math> </p> <p> <math>\therefore</math> bearing of A from C is <math>360 - (180 - 136.565)</math>          (oe) )       </p> <p>316.565 <math>\rightarrow</math> awrt <b>317</b></p>	4	M1 M1 M1 (DEP) (M1) (DEP) (M1) (DEP)