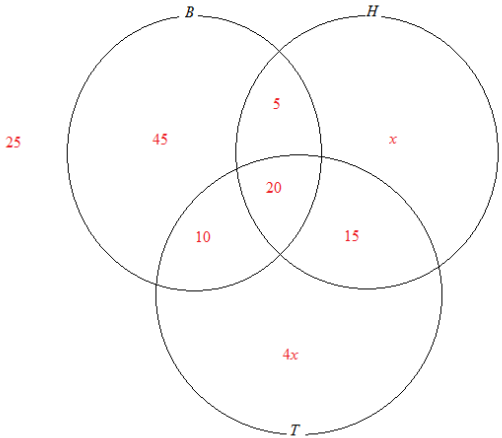


Question	Scheme		Mark	Notes	
1	(a)	$348 \times \frac{100}{60}$ oe	(\$) 580	2	M1 A1
	(b)	$"\$580" \times \frac{75}{100} - \$348$ OR $(0.40 - 0.25) \times "580"$ OR $(0.75 - 0.60) \times "580"$	(\$)87	2	M1 A1
2			$x = -14$ $y = 10$	4	M1 Rearranging st coef of $x$ or $y$ is the same in both eqns OR isolating $x$ or $y$ M1 (DEP) Substituting expression (or value correctly obtained) for $x$ or $y$ to obtain $y$ or $x$  <b>NB:</b> Allow a total of 1 slip in both M marks.  A1 A1

Question	Scheme	Mark	Notes
3 (a)	$576 = \frac{\alpha}{\left(\frac{1}{2}\right)^3}$ $\alpha = 72$ $\therefore f = \frac{72}{r^3}$	3	M1 A1 A1
(b)	$f = 5 + \frac{1}{t} = \frac{"72"}{2^3}$ (= 9) (oe)   $t = \frac{1}{4}$	2	M1  A1

Question	Scheme		Mark	Notes
4	One of $(1,1): -7 + 2x^2 = 1$ (ie 1 <sup>st</sup> column) $(2,1): -21 - 4x^2 = -37$ $(3,1): 35 - 6x^2 = 11$	$x = 2$	6	M1 A1
	One of $(1,2): 1 + 2("x" + 2y) = 1$ (ie 2 <sup>nd</sup> column) $(2,2): 3 - 4("x" + 2y) = 3$ $(3,2): -5 - 6("x" + 2y) = -5$	$y = -1$		M1 (DEP) A1
	One of $(1,3): -"x"z - 2"y" = -4$ (ie 3 <sup>rd</sup> column) $(2,3): -3"x"z + 4"y" = -22$ $(3,3): 5"x"z + 6"y" = 24$	$z = 3$		M1 (DEP) A1

Question	Scheme		Mark	Notes	
5 (a)			4	B1	25 correctly positioned
				B1	5, 10 and 15 correctly positioned
				B1	45 and 20 correctly positioned
				B1	4x correctly positioned in <i>T</i> and <i>x</i> correctly positioned in <i>H</i>
(b)			1	B1	ft
					$150 = 25 + \text{"45"} + \text{"5"} + x + \text{"10"} + 20 + \text{"15"} + 4x$ (oe)
					(ie 150 = their 8 values)
(c)	(eg $150 = \text{"120"} + 5x$ (oe))	(cao)	2	M1	Collecting “their” two <i>x</i> terms and equating them to “their” 7 constant values
					$x = 6$
(d)	$\left( \frac{\text{"10"} + \text{"20"}}{\text{"45"} + \text{"5"} + \text{"10"} + \text{"20"}} = \right)$	$\frac{\text{"30"}}{\text{"80}}$ (oe), "0.375", "37.5"%	1	A1 B1	Ft <b>NB:</b> ft on their diagram

Question		Scheme	Mark	Notes
6	(a)		1	B1
	(b)		1	B1
	(c)	$y(2x-3)=6$ (oe) OR $x(2y-3)=6$ (oe) $h^{-1}: x \mapsto \frac{6+3x}{2x}, \frac{3(2+x)}{2x}, \frac{3}{x} + \frac{3}{2}, h^{-1} = \frac{6+3x}{2x}$ (oe)	2	M1 A1
	(d)	$18x - x(2x-3) = 3(2x-3)$ (removing denominators, oe, allow 1 minor slip) $2x^2 - 15x - 9 (= 0)$ (oe) $x = \frac{-(-15) \pm \sqrt{((-15)^2 - 4 \times 2 \times (-9))}}{2 \times 2}$ <b>NB:</b> on their trinomial quadratic. -0.558 8.06		M1 A1 M1 (INDEP) A1 A1

Question	Scheme	Mark	Notes
7 (a)	$65 < t \leq 70$ fd = 4 (8 x 1cm squares) units $70 < t \leq 80$ freq = 50 runners $80 < t \leq 95$ fd=4units $95 < t \leq 115$ fd = 4.5 units $115 < t \leq 140$ freq = 75 and fd = 3 units	5	B1 B1 B1 B1 B1 ft
(b)	<div style="display: flex; justify-content: space-between;"> <div></div> <div><math>95 &lt; t \leq 115</math></div> </div>	1	B1 Ft <b>NB:</b> ft on “50” for $70 < t \leq 80$
(c)	Using a correct mid-pt  At least 3 correct products  $\frac{10 \times 62.5 + 20 \times 67.5 + "50" \times 75 + 60 \times 87.5 + 90 \times 105 + "75" \times 127.5}{305}$ $\left( = \frac{625 + 1350 + "3750" + 5250 + 9450 + 9562.5}{305} = \frac{29987.5}{305} \right)$	4	M1 M1 (DEP) M1 (DEP) A1 (cao)

Question		Scheme	Mark	Notes
8	(a) (i)		1	B1
	(ii)		1	B1
	(b)	$\overrightarrow{PQ} = \alpha(8\mathbf{b} - 4\mathbf{a}) = -\mathbf{a} + \frac{8}{m}\mathbf{b} \quad (= \overrightarrow{PO} + \overrightarrow{OQ})$	3	M1 A1 A1 <b>NB:</b> Cand. must use vectors as required by question.
	(c)	$\overrightarrow{PR} = \overrightarrow{PA} + \overrightarrow{AR} = 3\mathbf{a} + \frac{1}{n}(8\mathbf{b} - 4\mathbf{a})$ $\overrightarrow{PR} = \left(3 - \frac{4}{n}\right)\mathbf{a} + \frac{8}{n}\mathbf{b}, \quad 3\mathbf{a} - \frac{4}{n}\mathbf{a} + \frac{8}{n}\mathbf{b}, \quad \frac{3n\mathbf{a} - 4\mathbf{a} + 8\mathbf{b}}{n}$	2	M1 A1 <b>NB:</b> So <b>a</b> and <b>b</b> terms separated
	(d)	$PR$ parallel to $OB$ means “comp of <b>a</b> ” in $\overrightarrow{PR}$ above is zero  ( <b>OR</b> since triangles $AOB$ and $ARB$ are similar, $\frac{AP}{AO} = \frac{3}{4} = \frac{PR}{OB}$ , Comp of <b>b</b> in (c) means that $\therefore \overrightarrow{PR} = 6\mathbf{b} = \frac{8}{n}\mathbf{b}$ (M1))	2	M1 A1
	(e)	Triangles $OAB$ and $OPQ$ are similar (oe) $\therefore  \Delta OAB  = 4^2 \times  \Delta OPQ $ $APQB = 150 = \text{Triangle } OAB - \text{Triangle } OPQ$ $\therefore 150 = 4^2  \Delta OPQ  -  \Delta OPQ $ (oe) $\therefore  \Delta OPQ  = 10(\text{cm}^2)$	3	M1 M1 A1 (DEP)

Question		Scheme	Mark	Notes
9	(a)	Triangle $S$ drawn and labelled	1	B1
	(b)	Triangle $T$ drawn and labelled $\left(\Delta T = \begin{pmatrix} 2 & 3 & 3 \\ 4 & 4 & 6 \end{pmatrix}\right)$	2	B2 (-1ee)
	(c)	Either point $(-2,2)$ indicated <b>OR</b>  At least two construction lines through $(-2,2)$  Triangle $U$ $\left(\Delta U = \begin{pmatrix} -6 & -7 & -7 \\ 0 & 0 & -2 \end{pmatrix}\right)$  <b>NB:</b> Award M1 A2 if $(-2,2)$ not indicated and no construction lines but $\Delta U$ drawn correctly  Award M1 A1 A0 if $\Delta U$ drawn correctly except for one Vertice.	3	M1 A2 (-1ee)
	(d)	Triangle $V$ drawn and labelled $\left(\Delta V = \begin{pmatrix} -1 & -2 & -2 \\ -1 & -1 & -3 \end{pmatrix}\right)$  <b>NB:</b> ft on “triangle $U$ ”	2	B2) ft (-1ee
	(e)	$\begin{pmatrix} -3 & 1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} -1 & -2 & -2 \\ -1 & -1 & -3 \end{pmatrix}$  Triangle $W$ drawn and labelled $\left(\Delta W = \begin{pmatrix} 2 & 5 & 3 \\ -2 & -3 & -5 \end{pmatrix}\right)$		M1 A2 (-1ee)
	(f)	-4	1	B1
	(g)	1 : 4	1	B1



Question		Scheme	Mark	Notes
10	(a)	$\sin 25 = \frac{20}{AB}$	2	M1 A1
	(b)	$47.3240 \rightarrow \mathbf{47.3} \text{ (cm)}$ $\cos 20 = \frac{FC}{15}$ $14.0954 \rightarrow \mathbf{14.1} \text{ (cm)}$	2	M1 A1
	(c)	$AC^2 = AB^2 + 15^2 - 2 \times AB \times 15 \times \cos 95$ $AC = \sqrt{(AB^2 + 15^2) - (2 \times AB \times 15 \times \cos 95)}$ $\mathbf{50.9 \text{ (cm)}}$	3	M1 M1 A1 (DEP)
	(d)	<p><u>Method 1:</u> <math>ABCD =  \Delta ABC  +  \Delta ACD </math></p> <p><b>Scheme:</b> <math>\Delta ABC</math>: M1 (angle for area formula), M1 (area formula)</p> <p><math>\Delta ACD</math>: M1 (angle or side for area formula), M1 (area formula)</p> <p><math>ABCD</math>: M1 (adding areas) A1</p> <p><math>\angle ABC = 25 + (180 - 90 - 20) \text{ (= 95)}</math></p> <p><b>NB:</b> <math>\angle ABC</math> must be evaluated to <b>95</b></p> $ \Delta ABC  = \frac{1}{2} \times 15 \times AB \times \sin \angle ABC \quad \left( = \begin{cases} 353.6 & \text{using 4sf} \\ 353.4 & \text{using 3sf} \end{cases} \right)$	6	M1 (DEP)  M1       M1 M1 (DEP))