

④

$$x: -1 - (-6) = 5$$

$$\frac{2}{5} \text{ of } 5 = 2$$

$$-6 + 2 = -4$$

$$y: 11 - 1 = 10$$

$$\frac{2}{5} \text{ of } 10 = 4$$

$$1 + 4 = 5$$

$$z: -8 - 2 = -10$$

$$\frac{2}{5} \text{ of } -10 = -4$$

$$-8 + (-4) = -12$$

$$R(-4, 5, -2)$$

Question			Generic scheme	Illustrative scheme	Max mark
4.			Method 1 • ¹ interpret ratio • ² find coordinates of R	Method 1 • ¹ $\begin{pmatrix} 2 \\ 4 \\ -4 \end{pmatrix}, \begin{pmatrix} -2 \\ -4 \\ 4 \end{pmatrix}, \begin{pmatrix} 3 \\ 6 \\ -6 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ -6 \\ 6 \end{pmatrix}$ • ² $(-4, 5, -2)$	2
			Method 2 • ¹ interpret ratio • ² find coordinates of R	Method 2 • ¹ eg $\overline{PR} = \frac{2}{5}\overline{PQ}, \overline{QR} = \frac{3}{5}\overline{QP}$ or $\overline{PR} = \frac{2}{3}\overline{RQ}$ • ² $(-4, 5, -2)$	
			Method 3 • ¹ use section formula • ² find coordinates of R	Method 3 • ¹ $\frac{1}{5}(3\mathbf{p} + 2\mathbf{q})$ • ² $(-4, 5, -2)$	
Notes:					
1. For $(-4, 5, -2)$ without working award 2/2. 2. For $\begin{pmatrix} -4 \\ 5 \\ -2 \end{pmatrix}$ without working award 1/2. 3. For $(-3, 7, -4)$ (ratio of 3:2 with working) award 1/2. See Candidate A. 4. For $\begin{pmatrix} -3 \\ 7 \\ -4 \end{pmatrix}$ without working award 0/2.					
Commonly Observed Responses:					
Candidate A $\overline{PR} = \frac{3}{5}\overline{PQ}$ $R = (-3, 7, -4)$			• ¹ ✗ • ² ✓ ₁	Candidate B $\frac{\overline{PR}}{\overline{RQ}} = \frac{2}{3}$ $3\overline{PR} = 2\overline{RQ}$ $3(\mathbf{r} - \mathbf{p}) = 2(\mathbf{q} - \mathbf{r})$ $5\mathbf{r} = 2\mathbf{q} + 3\mathbf{p}$ Leading to correct answer of $R = (-4, 5, -2)$	• ¹ ✓ • ² ✓

Question	Generic scheme	Illustrative scheme	Max mark
4. (continued)			
Candidate C $\overrightarrow{PQ} = \begin{pmatrix} 5 \\ 10 \\ -10 \end{pmatrix}$ $R = \begin{pmatrix} 2 \\ 4 \\ -4 \end{pmatrix}$ $R = \begin{pmatrix} -6 \\ 1 \\ 2 \end{pmatrix} + \begin{pmatrix} 2 \\ 4 \\ -4 \end{pmatrix}$ $R = \begin{pmatrix} -4 \\ 5 \\ -2 \end{pmatrix}$ $R(-4, 5, -2)$	•¹ ✓ •² ✓	Candidate D $\overrightarrow{PR} = \begin{pmatrix} 2 \\ 4 \\ -4 \end{pmatrix}$ $R(-8, -3, 6)$	•¹ ✓ •² ✗
Candidate E - stepping out using absolute values $\begin{matrix} 2 & : & 3 \\ & 5 & \\ -6 & \text{---} & -1 \\ & 2 & \text{or} & 3 \\ & 10 & \end{matrix}$ $\begin{matrix} 1 & \text{---} & 11 \\ & 4 & \text{or} & 6 \\ & 10 & \end{matrix}$ $\begin{matrix} 2 & \text{---} & -8 \\ & 4 & \text{or} & 6 \end{matrix}$ $R(-4, 5, -2)$	•¹ ✓ •² ✓		