

Question		Answer	Mark	AO	Guidance
2	(a)	$10 k $	<b>B1</b> <b>[1]</b>	<b>1.1</b>	Allow $10k$
2	(b)	$\overrightarrow{BP} = \begin{pmatrix} 6k - 1 \\ -2 \\ 8k - 3 \end{pmatrix} \text{ or } \overrightarrow{PB} = \begin{pmatrix} 1 - 6k \\ 2 \\ 3 - 8k \end{pmatrix}$ $100k^2 + (6k - 1)^2 + (-2)^2 + (8k - 3)^2 = 14$ $200k^2 - 60k + 14 = 14$ $k = \frac{3}{10}$	<b>B1</b>	<b>3.1a</b>	May be implied (but must be fully correct to imply, i.e. including (-2))
		$100k^2 + (6k - 1)^2 + (-2)^2 + (8k - 3)^2 = 14$ $200k^2 - 60k + 14 = 14$ $k = \frac{3}{10}$	<b>M1</b> <b>A1</b> <b>A1</b>	<b>1.1</b> <b>1.1</b> <b>1.1</b>	Attempt $OP^2 + BP^2 = OB^2$ FT their $OP$ and $\overrightarrow{BP}$ or $\overrightarrow{PB}$ Correct equation after expanding brackets oe Condone inclusion of $k = 0$ (whether eliminated or not)
		<p><b>Alternative method using scalar product</b></p> $\overrightarrow{BP} = \begin{pmatrix} 6k - 1 \\ -2 \\ 8k - 3 \end{pmatrix} \text{ or } \overrightarrow{PB} = \begin{pmatrix} 1 - 6k \\ 2 \\ 3 - 8k \end{pmatrix}$ $6k(6k - 1) + 0 + 8k(8k - 3) = 0$ $100k^2 - 30k = 0$ $k = \frac{3}{10}$	<b>B1</b> <b>M1</b> <b>A1</b> <b>A1</b>		May be implied  Attempt $\overrightarrow{OP} \cdot \overrightarrow{BP} = 0$ FT their $\overrightarrow{OP}$ and $\overrightarrow{BP}$ or $\overrightarrow{PB}$ (or attempt $\overrightarrow{OA} \cdot \overrightarrow{BP} = 0 \Rightarrow 6(6k - 1) + 0 + 8(8k - 3) = 0$ ) Must be algebraic – i.e. an equation of this form in $k$ . Correct equation after expanding brackets Or $100k - 30 = 0$ oe Condone inclusion of $k = 0$ (whether eliminated or not)
			<b>[4]</b>		