Question			Answer	Marks	AO	Guidance	
8	(a)		$\left(5,\ \frac{8+p}{2}\right)$	**B1** **[1]**	**1.1**	Allow unsimplified e.g. $\left(\frac{4+6}{2},\frac{8+p}{2}\right)$ Allow $x=\frac{4+6}{2}, y=\frac{8+p}{2}$	ISW if correct unsimplified answer is incorrectly simplified
8	(b)		$(m_{AB}=)\frac{p-8}{2}$	**B1** **[1]**	**1.1**	Allow unsimplified e.g. $\frac{8-p}{4-6}$	ISW if correct unsimplified answer is incorrectly simplified
8	(c)		$(m_{\perp}=)\frac{2}{8-p}$	**B1FT**	**2.1**	Correctly applies $m_1m_2=-1$ to their answer to part **(b)** to obtain the gradient of the line perp. to *AB*	
			$y-\left(\frac{8+p}{2}\right)=\frac{2}{8-p}(x-5)$	**M1***	**3.1a**	Setting up an equation in p for the line through the midpoint of *AB* perp. to *AB* . Could use $y=mx+c$ and obtain c in terms of p.	Using their part **(a)** or $\left(\frac{7}{5}p,0\right)$ and their perp. gradient to *AB*
			$0-\left(\frac{8+p}{2}\right)=\frac{2}{8-p}\left(\frac{7}{5}p-5\right)$	**M1dep***	**1.1**	Substituting $\left(\frac{7}{5}p,0\right)$ into their line. Could obtain another expression for c using the other point and equate the two expressions of c.	Or their part **(a)**
			$5p^2-28p-220=0$ or $5p^3-68p^2+4p+1760=0$	**A1**	**1.1**	Expand and simplify to a 3TQ in p or possibly a 4 term cubic in p.	
			($p=10$ and) so $x=14$	**A1** **[5]**	**3.2a**	**BC** cao	

Question			Answer	Marks	AO	Guidance	
8	(c)		Alternative method using gradients only: $(m_{\perp} =) \dfrac{2}{8-p}$	**B1FT**	**2.1**	Correctly applies $m_1 m_2 = -1$ to their answer to part **(b)** to obtain the gradient of the line perp. to *AB*	
			$(m_{\perp} =) \dfrac{\frac{8+p}{2} - 0}{5 - \frac{7}{5}p}$	**M1***	**3.1a**	Obtains an expression for the gradient between their part **(a)** and $\left(\frac{7}{5}p,\ 0\right)$.	
			$\dfrac{2}{8-p} = \dfrac{\frac{8+p}{2}}{5 - \frac{7}{5}p}$	**M1dep***	**1.1**	Equates the two expressions for the gradient to obtain an equation in p.	
			$5p^2 - 28p - 220 = 0$	**A1**	**1.1**	Expand and simplify to a 3TQ in p	
			(p = 10 and) so x = 14	**A1** **[5]**	**3.2a**	**BC** cao	