23	$\overrightarrow{PM} = -\frac{3}{2}\mathbf{a} - \frac{3}{4}\mathbf{b} + 4\mathbf{a} + \frac{1}{2}(2\mathbf{b} - 4\mathbf{a}) \left(= \frac{1}{2}\mathbf{a} + \frac{1}{4}\mathbf{b}\right)$ $\overrightarrow{AM} = 4\mathbf{a} + \frac{1}{2}(2\mathbf{b} - 4\mathbf{a}) (= 2\mathbf{a} + \mathbf{b})$ $\overrightarrow{AM} = 2\mathbf{b} + \frac{1}{2}(4\mathbf{a} - 2\mathbf{b}) (= 2\mathbf{a} + \mathbf{b})$ $\overrightarrow{MA} = \frac{1}{2}(2\mathbf{b} - 4\mathbf{a}) - 2\mathbf{b} (= -2\mathbf{a} - \mathbf{b})$ $\overrightarrow{MA} = \frac{1}{2}(4\mathbf{a} - 2\mathbf{b}) - 4\mathbf{a} (= -2\mathbf{a} - \mathbf{b})$		3	M1 for finding $\overrightarrow{PM}$ or $\overrightarrow{AM}$ or $\overrightarrow{MA}$
	$(AP : PM =) \left\lvert\frac{3}{2}\mathbf{a} + \frac{3}{4}\mathbf{b}\right\rvert : \left\lvert\frac{1}{2}\mathbf{a} + \frac{1}{4}\mathbf{b}\right\rvert$ oe $(AP : AM =) \left\lvert\frac{3}{2}\mathbf{a} + \frac{3}{4}\mathbf{b}\right\rvert : \lvert 2\mathbf{a} + \mathbf{b}\rvert (= 3 : 4)$ oe $(AM : PM =) \lvert 2\mathbf{a} + \mathbf{b}\rvert : \left\lvert\frac{1}{2}\mathbf{a} + \frac{1}{4}\mathbf{b}\right\rvert (= 4 : 1)$ oe $AP = 3PM$ oe eg $\frac{3}{2}\mathbf{a} + \frac{3}{4}\mathbf{b} = 3(\frac{1}{2}\mathbf{a} + \frac{1}{4}\mathbf{b})$ oe $AM = \frac{4}{3}AP$ oe $AM = 4PM$ oe			M1 For use of a correct ratio or fraction linking *AP* and *PM* **or** *AP* and *AM* **or** *AM* and *PM* (in either order) vectors must be in form $p\mathbf{a} + q\mathbf{b}$
		3 : 1		A1
				Total 3 marks