22	gradient of $JK = -0.5$ **or** $m \times 2 = -1$		6	M1 for finding the gradient of JK using $m_1 \times m_2 = -1$
	$\frac{k-15}{6-j} = -\frac{1}{2}$ **or** $2k - j = 24$ **or** $j = 2k - 24$ **or** $k = \frac{j+24}{2}$ oe			M1 for expressing the gradient of JK in terms of j and k or a correct equivalent equation
	$(j-6)^2 + (k-15)^2 = 80$ oe **or** $\left(\frac{j+6}{2}, \frac{k+15}{2}\right)$ oe **or** $(j+4)^2 + 196 = 100 + (k-1)^2$ oe			M1 for finding equation of JK in terms of j and k **or** for finding the midpoint of M **or** for equating length HJ with length HK
	eg $3k^2 - 78k + 495 = 0$ oe **or** $5j^2 - 60j - 140 = 0$ oe **or** $5k^2 - 150k + 1045 = 0$ oe **or** $3j^2 - 12j - 36 = 0$ **oe** **or** gradient HM: eg $\frac{\frac{k+15}{2}-1}{\frac{j+6}{2}+4} = 2$ **or** $k = 2j + 15$ **or** $j = \frac{k-15}{2}$ oe			M1 (dep on M3) writing a correct quadratic expression in the form $ax^2 + bx + c$ $(= 0)$ (allow $ax^2 + bx = c$) **or** A correct equation for the gradient of HM in terms of j and k or a correct equivalent equation
	eg $(k-15)(k-11)(=0)$ **or** $\frac{78 \pm \sqrt{(-78)^2 - 4 \times 3 \times 495}}{2 \times 3}$ **or** $(k-13)^2 - 169 + 165 (= 0)$	eg $(j-6)(j+2)(=0)$ **or** $\frac{12 \pm \sqrt{(-12)^2 - 4 \times 3 \times -36}}{2 \times 3}$ **or** $(j-2)^2 - 4 - 12 (= 0)$		M1 (dep on M3) for a complete method to solve their 3-term quadratic equation (allow one sign error in the use of the quadratic formula) **or** a correct method to eliminate either j or k eg $2k - 24 = \frac{k-15}{2}$ oe **or** $\frac{j+24}{2} = 2j + 15$ oe
	$j = -2, k = 11$			A1
				Total 6 marks

22		$\left(\frac{j+6}{2}, \frac{k+15}{2}\right)$ oe		6	M1 for finding the midpoint of M
ALT		$\frac{\frac{k+15}{2}-1}{\frac{j+6}{2}+4} = 2$ **or** $k - 2j = 15$ **or** $k = 2j + 15$ **or** $j = \frac{k-15}{2}$ oe			M1 for expressing the gradient of JK in terms of j and k or a correct equivalent equation
		$(j - 6)^2 + (k - 15)^2 = 80$ oe **or** $(j+4)^2 + 196 = 100 + (k-1)^2$ oe			M1 for finding the length of JK in terms of j and k **or** for equating length HJ with length HK
		E.g. $5j^2 - 12j - 44 = 0$ **or** $3j^2 + 48j + 84 = 0$ oe	E.g. $5k^2 - 174k + 1309 = 0$ **or** $3k^2 + 6k - 429 = 0$ oe		M1 (dep on M3) writing the correct quadratic expression in form $ax^2 + bx + c$ (= 0) allow $ax^2 + bx = c$
		E.g. $(5j - 22)(j + 2)(= 0)$ **or** $\frac{12 \pm \sqrt{(-12)^2 - 4 \times 5 \times -44}}{2 \times 5}$ **or** $(j+8)^2 - 64 + 28(=0)$	E.g. $(5k - 119)(k - 11)(= 0)$ **or** $\frac{174 \pm \sqrt{(-174)^2 - 4 \times 5 \times 1309}}{2 \times 5}$ **or** $(k+1)^2 - 1 - 143(=0)$		M1 (dep on M3) for a complete method to solve their 3-term quadratic equation (allow one sign error in the use of the quadratic formula)
		$j = -2, k = 11$			A1
					Total 6 marks

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