Question	Scheme	Marks	AOs
14(a)(i) (ii)	$(2k, -k)$	B1	1.1b
	$(\pm 2k)^2 + (\pm k)^2 = ...$	M1	1.1b
	$\sqrt{5k^2 - 80}$	A1	1.1b
		(3)	
(b)	$x^2 + (k-2x)^2 - 4kx + 2k(k-2x) + 80 = 0$ $\Rightarrow 5x^2 - 12kx + 3k^2 + 80 = 0$	M1A1	3.1a 1.1b
	$(-12k)^2 - 4 \times 5 \times (3k^2 + 80) < 0 \Rightarrow \text{CV} = \frac{20\sqrt{21}}{21}$	M1	2.1
	$\left\{k : 4 < k < \frac{20\sqrt{21}}{21}\right\}$	M1A1	1.1b 2.5
		(5)	
			(8 marks)

Notes

(a)

B1: $(2k, -k)$

M1: Attempts to use Pythagoras' theorem to find the radius^2 (may be implied by their radius)

A1: $\sqrt{5k^2 - 80}$

(b)

M1: Substitutes $y = k - 2x$ into the equation for *C*, multiplies out and proceeds to a three term quadratic in *x*

A1: $5x^2 - 12kx + 3k^2 + 80 = 0$ or simplified equivalent. Terms do not need to be on the same side of the equation and the = 0 may be implied. May also be implied by their values for *a*, *b* and *c* when using the discriminant.

M1: Attempts the discriminant using their *a*, *b* and *c* where *b* and *c* are both in terms of *k* and attempts to find the critical value which is greater than 4 (usual rules apply for solving a quadratic). Do not be concerned if they find the other critical value "$-\frac{20\sqrt{21}}{21}$" for this mark.

M1: Attempts to find the correct inside region using their critical value which is greater than 4 so score for either $4 < k < "\frac{20\sqrt{21}}{21}"$ or $"-\frac{20\sqrt{21}}{21}" < k < "\frac{20\sqrt{21}}{21}"$. Set notation is not required for this mark.

A1: $\left\{k : 4 < k < \frac{20\sqrt{21}}{21}\right\}$ or equivalent using set notation. Look for $\{\ \}$ with the correct region in terms of *k*.