Question number	Scheme	Marks
7 (a)	**Throughout this question condone missing degree signs** $\cos\theta^\circ = \frac{6^2+8^2-k^2}{2\times6\times8} = \frac{100-k^2}{96}$ *	M1A1cso [2]
(b)	$\sqrt{455} = \frac{1}{2}\times6\times8\times\sin\theta^\circ$ $\Rightarrow \sin\theta^\circ = \frac{\sqrt{455}}{24} \Rightarrow \left(\sin^2\theta^\circ = \frac{455}{576}\right)$ $\cos^2\theta^\circ = 1-\sin^2\theta^\circ \Rightarrow \cos^2\theta^\circ = 1-\frac{455}{576} = \frac{121}{576}$ $\Rightarrow \cos\theta^\circ = \pm\frac{11}{24}$ both values required $\cos\theta^\circ = \frac{11}{24} = \frac{100-k^2}{96} \Rightarrow k^2 = 56 \Rightarrow k = \sqrt{56} = \left(2\sqrt{14}\right)$ $\cos\theta^\circ = -\frac{11}{24} = \frac{100-k^2}{96} \Rightarrow k^2 = 144 \Rightarrow k = 12$ **ALT** $\sqrt{455} = \frac{1}{2}\times6\times8\times\sin\theta^\circ$ $\Rightarrow \sin\theta^\circ = \frac{\sqrt{455}}{24}$ $\theta^\circ = \sin^{-1}\left(\frac{\sqrt{455}}{24}\right)$ $(= 62.72\ldots^\circ)$ $\theta^\circ = 62.72\ldots, 117.27\ldots$ both values required $\cos\theta^\circ = \frac{100-k^2}{96} \Rightarrow k^2 = 100-96\cos\theta^\circ$ $\Rightarrow k^2 = 100-96\cos 62.72\ldots \Rightarrow k^2 = 56 \Rightarrow k = \sqrt{56}$ $\cos\theta^\circ = \frac{100-k^2}{96} \Rightarrow k^2 = 100-96\cos\theta^\circ$ $\Rightarrow k^2 = 100-96\cos 117.27\ldots \Rightarrow k^2 = 144 \Rightarrow k = 12$	M1 A1 M1 A1 M1A1 A1 [7] [M1 A1 M1 A1 M1A1 A1]
		Total 9 marks

Part	Mark	Notes
(a)	**M1**	For correct substitution into the cosine rule and attempt to rearrange to find an expression for $\cos\theta^\circ$
	A1 cso	For obtaining the given expression for $\cos\theta$ $\cos\theta^\circ = \frac{100-k^2}{96}$ **Note: This is a show question. There must be no errors seen.**

(b)	**M1**	For using the **correct** formula for area of a triangle and substitution of the given values to obtain $\sqrt{455} = \frac{1}{2} \times 6 \times 8 \times \sin\theta°$ and attempt to rearrange to obtain $\sin\theta° = \cdots$
	A1	$\sin\theta° = \frac{\sqrt{455}}{24}$ Allow for $\sin\theta = \frac{\sqrt{455}}{0.5\times8\times6}$
	M1	For use of $\sin^2\theta + \cos^2\theta = 1$ to obtain a value for $\cos\theta°$. $\cos^2\theta° = 1 - \frac{'455'}{576} \Rightarrow \cos\theta° = \pm\sqrt{1 - \frac{'455'}{576}}$ Allow use of their $\sin\theta°$ provided $-1 \leq \sin\theta° \leq 1$ Allow if only one value of $\cos\theta°$ obtained.
	A1	$\cos\theta° = \pm\frac{11}{24}$
	M1	For forming an equation for k using their $\cos\theta°$ and attempt to solve for k. $\cos\theta° = \frac{'11'}{24} = \frac{100-k^2}{96} \Rightarrow k^2 = 56 \Rightarrow k = \sqrt{56}$ $\cos\theta° = '-\frac{11'}{24} = \frac{100-k^2}{96} \Rightarrow k^2 = 144 \Rightarrow k = 12$
	A1	For one correct value of k $\sqrt{56}$ or awrt 7.48 **or** awrt 12
	A1	For both correct values of k $\sqrt{56}$ or awrt 7.48 **and** awrt 12
ALT – working with angles		
	M1	For using the **correct** formula for area of a triangle and substitution of the given values to obtain $\sqrt{455} = \frac{1}{2} \times 6 \times 8 \times \sin\theta°$ and attempt to rearrange to obtain $\sin\theta° = \cdots$
	A1	$\sin\theta° = \frac{\sqrt{455}}{24}$ Allow for $\sin\theta = \frac{\sqrt{455}}{0.5\times8\times6}$
	M1	For use of the inverse trigonometric function to obtain a value for $\theta°$ $\theta° = 62.72\ldots, 117.27\ldots$ If working not shown then award for angle correct to a minimum of 1 d.p. Allow if only one value of $\theta°$ found. Condone working in radians awrt 1.09, awrt 2.05
	A1	$\theta° = 62.72\ldots, 117.27\ldots$ Allow awrt 62.7°, 117.3° Both angles found. Condone working in radians awrt 1.09, awrt 2.05
	M1	For forming an equation in k using their θ and an attempt to solve for k. $\cos\theta° = \frac{100-k^2}{96} \Rightarrow k^2 = 100 - 96\cos\theta°$ $\Rightarrow k^2 = 100 - 96\cos 62.72\ldots \Rightarrow k^2 = 56 \Rightarrow k = \sqrt{56}$ $\cos\theta° = \frac{100-k^2}{96} \Rightarrow k^2 = 100 - 96\cos\theta°$ $\Rightarrow k^2 = 100 - 96\cos 117.27\ldots \Rightarrow k^2 = 144 \Rightarrow k = 12$
	A1	For one correct value of k $\sqrt{56}$ or awrt 7.48 **or** awrt 12
	A1	For both correct values of k and no others. $\sqrt{56}$ or awrt 7.48 **and** awrt 12