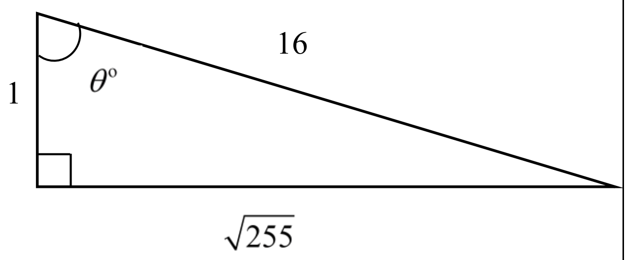
Question number	Scheme	Marks
6 (a)	$\tan\theta^{\circ} = \sqrt{255}$ $1^2 + 255 = 256$ $\sqrt{256} = 16$  $\Rightarrow \cos\theta^{\circ} = \dfrac{1}{16}$ *	M1A1cso (2)
(b)	$\cos\theta^{\circ} = \dfrac{1}{16} = \dfrac{x^2 + (x+4)^2 - (2x-2)^2}{2\times x\times(x+4)}$ $\Rightarrow 0 = 17x^2 - 124x - 96$ $\Rightarrow x = \dfrac{124 \pm \sqrt{124^2 - 4\times17\times(-96)}}{2\times17} = 8$ (other root not needed)	M1A1A1 M1A1 (5)
(c)	**Method 1** $\{AB = 8,\quad AC = 12,\quad BC = 14\}$ Uses sine rule to find ABC $\left[\theta^{\circ} = \tan^{-1}\sqrt{255} = 86.416...\right]$ $\dfrac{\sin 86.416}{14} = \dfrac{\sin ABC}{12} \Rightarrow \angle ABC = \sin^{-1} 0.855467... = 58.8^{\circ}$	M1A1 (2)
	Method 2 $\{AB = 8,\quad AC = 12,\quad BC = 14\}$ Uses cosine rule $\cos ABC = \dfrac{8^2 + 14^2 - 12^2}{2\times8\times14} = 0.5178... \Rightarrow ABC = 58.8^{\circ}$	{M1A1} {(2)}
(d)	Area $= \dfrac{1}{2}\times8\times14\times\sin 58.8 = 47.9$ (cm^2) **ALT** Uses Heron's formula $s = \dfrac{8+12+14}{2} = 17$ $A = \sqrt{17(17-8)(17-12)(17-14)} = 47.9$	M1A1 (2) {M1A1}

		[11]

Additional Notes		
Part	**Mark**	**Guidance**
(a)	M1	Uses the tangent ratio with Pythagoras theorem to establish that the hypotenuse is '16' **.** This is a show question, we **must see** evidence of Pythagoras theorem used for this mark.
	A1	For $\cos\theta^{\circ} = \frac{1}{16}$ cso
	ALT	
	M1	$\tan\theta = \sqrt{255} \Rightarrow 255 = \frac{\sin^2\theta}{\cos^2\theta} \Rightarrow \sin^2\theta = 255\cos^2\theta$ $\cos^2\theta + 255\cos^2\theta = 1 \Rightarrow \cos^2\theta = \frac{1}{256}$ There must be a complete method for the award of this mark.
	A1	For $\cos\theta^{\circ} = \frac{1}{16}$ cso
(b)	M1	For attempting to use cosine rule. (Any attempt to use sine rule is M0)
	A1	Uses a correct cosine rule either form, substitutes $\cos\theta^{\circ} = \frac{1}{16}$ Alternative form of cosine rule: $(2x-2)^2 = (x+4)^2 + x^2 - 2\times(x+4)\times x\times\frac{1}{16}$ (Allow $\cos 86.4^{\circ}$ for this mark)
	A1	For forming a correct 3TQ
	M1	Attempts to solve **their** 3TQ (See general guidance)
	A1	$x = 8$ (ignore other root)
(c)	M1	Uses correct trigonometry (sine or cosine rule using their value for x) and achieves a value for angle ABC.
	A1	$\angle ABC = 58.8^{\circ}$
(d)	M1	Uses $\frac{1}{2}ab\sin C$ correctly with their value of x and their angle ABC (if they use that angle) to find the area of the triangle.
	A1	For 47.9 (cm^2)
	ALT	
	M1	Uses a correct Heron's formula with values derived from their x.
	A1	For 47.9 (cm^2)

Useful sketch