

Question	Working	Answer	Mark	Notes
21 (a)	$AG^2 = \boxed{12^2 + 4^2 (= 160)} \text{ or}$ $AC^2 = \boxed{12^2 + 3^2 (= 153)} \text{ or}$ $AE^2 = \boxed{4^2 + 3^2 (= 25)}$		3	<p>M1 A correct method to find <math>AG^2</math>, <math>AC^2</math>, <math>AE^2</math>, <math>AG</math>, <math>AC</math> or <math>AE</math>. Allow use of trig but must be fully correct method eg</p> $\angle GAB = \boxed{\tan^{-1} \left( \frac{4}{12} \right) [= 18.434\dots]} \text{ and}$ $AG = \boxed{\frac{12}{\cos "18.434\dots"} } \text{ Ignore incorrect labels}$ <p>labels</p>
	$AF^2 = \boxed{3^2 + "160"} \text{ or } 3^2 + ("4\sqrt{10}")^2$ $AF^2 = \boxed{4^2 + "153"} \text{ or } 4^2 + ("3\sqrt{17}")^2$ $AF^2 = \boxed{12^2 + "25"} \text{ or}$ $AF^2 = \boxed{169}$			<p>M1 full method to find <math>AF^2</math>  For this mark allow values correct to 3sf. but condone truncation eg <math>4^2 + (\text{awrt } 12.3)^2</math> or <math>3^2 + (\text{awrt } 12.64)^2</math> Ignore incorrect labels  <b>NB</b> <math>\sqrt{160} = 12.649\dots</math> <math>\sqrt{153} = 12.369\dots</math></p>
	Working required	13		A1 dependedent on both method marks awarded. For a full method to find $AF$ with no incorrect working seen and 13 stated Must see 169 or a correct expression for $AF^2$ with exact values used.
(b)	$\sin GAF = \frac{3}{13} \text{ or } \tan GAF = \frac{3}{\sqrt{160}}$ $\text{or } \cos GAF = \frac{\sqrt{160}}{13} \quad \text{oe}$		2	<p>M1 A correct method to find <math>\angle GAF</math> or trig ratio of <math>\angle GAF</math>  May ft values from part (a) including their <math>AF</math> if it is not 13 if it is clearly labelled or comes from a correct calculation  Allow ( <math>\tan AFG = \frac{\sqrt{160}}{3}</math> or <math>\sin AFG = \frac{\sqrt{160}}{13}</math> or <math>\cos AFG = \frac{3}{13}</math> ) and <math>90 - \angle AFG</math>  Allow use of cosine or sine rule eg <math>3^2 = 160 + 13^2 - 2 \times \sqrt{160} \times 13 \cos GAF</math></p>
	Correct answer scores full marks (unless from obvious incorrect working)	13.3		A1 awrt 13.3 Allow awrt 13.4
				<b>Total 5 marks</b>