Question	Scheme	Marks	AOs
3 (a)	Angle $ACB = 33°$	B1	1.1b
	Attempts $\left\{AB^2 =\right\} 8.2^2 + 15.6^2 - 2 \times 8.2 \times 15.6 \cos 33°$	M1	1.1b
	Distance = awrt 9.8 {km}	A1	1.1b
		(3)	
(b)	• Explains that the road is not likely to be straight {and therefore the distance will be greater}. • Explains that there are likely to be objects in the way {that they must go around and therefore the distance travelled will be greater}. • The {bases of the} masts are not likely to lie in the same {horizontal} plane {and so the distance will be greater}.	B1	3.2b
		(1)	
		(4 marks)	

Notes:

(a)

B1: 33 seen anywhere but allow $72 - 39$. May be indicated on a diagram (including incorrectly) or on the given Figure 1 and it might be named incorrectly.

M1: Uses the given model and attempts to use the cosine rule to find the distance or distance^2

Award for $8.2^2 + 15.6^2 - 2 \times 8.2 \times 15.6 \cos ...$ where ... must be a value.

A1: awrt 9.8 {km} isw

(a) **Alternative**

B1: $\left\{\overrightarrow{AB} =\right\} \pm \begin{pmatrix} 15.6\cos 51 - 8.2\cos 18 \\ 15.6\sin 51 - 8.2\sin 18 \end{pmatrix}$ **or** $\pm \begin{pmatrix} 15.6\sin 39 - 8.2\sin 72 \\ 15.6\cos 39 - 8.2\cos 72 \end{pmatrix}$ o.e.

May be implied by calculation that leads to $\begin{pmatrix} \text{awrt} \pm 2.0 \\ \text{awrt} \pm 9.6 \end{pmatrix}$ e.g. $\begin{pmatrix} 9.8 \\ 12.1 \end{pmatrix} - \begin{pmatrix} 7.8 \\ 2.5 \end{pmatrix}$

Note: they may find components separately and condone, e.g., $\begin{pmatrix} \text{awrt} \pm 9.6 \\ \text{awrt} \pm 2.0 \end{pmatrix}$

M1: Attempts to find $\overrightarrow{AB}$ (as above) **and** uses Pythagoras to find distance or distance^2

A1: awrt 9.8 {km} isw

(b)

B1: A valid reason based on the assumptions, i.e., the plane is not really horizontal
or the journey not being in a straight line.

Do not accept answers referencing the accuracy of the answer to part (a) being to 1d.p. or the accuracy of the values given in the question, **but** ignore if there is a separate, valid reason.

Some examples:

"Because it is unlikely the bearings are exact" – B0 see above.

"Because they may not walk in a straight line because they could take another longer or shorter route as their route could be more curved" – B0 – incorrect comment about there being a shorter route.

"Because they won't travel in one direction due to the roads" – B1 BOD

"Impossible and unrealistic to walk in a straight line" – B1