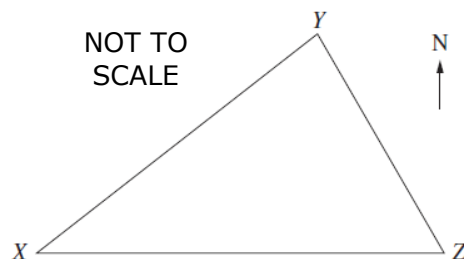




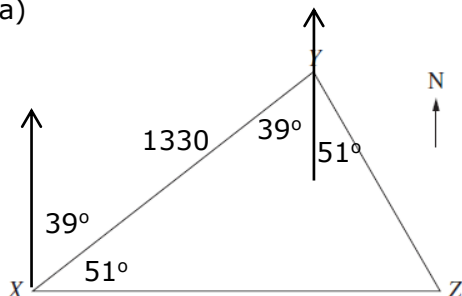
- MA 12** The diagram shows the three towns X, Y and Z. Town Z is due east of Town X. The bearing of Town Y from Town X is N39°E and the bearing of Town Z from Town Y is S51°E. The distance between Town X and Town Y is 1330 km.



A plane flies between the three towns.

- (a) Mark the given information on the diagram and explain why $\angle XYZ$ is 90° . **2**
 (b) Find the distance between Town X and Town Z to the nearest kilometre. **2**
 (c) The plane is going to fly from Town Y to Town X, stopping at Town Z on the way. Leaving Town Y, the pilot incorrectly sets the bearing of Town Z to S50°E. The pilot flies for 1650 km before realizing the mistake, then changes course and flies directly to Town X without going to Town Z. Which is closer to Town X: Town Z or the point where the pilot changes course? Justify your answer. **3**

(a)



By alternate angles on parallel lines and angle sum of triangle result, $\angle XYZ = 90^\circ$

$$(b) \frac{1330}{XZ} = \cos 51^\circ$$

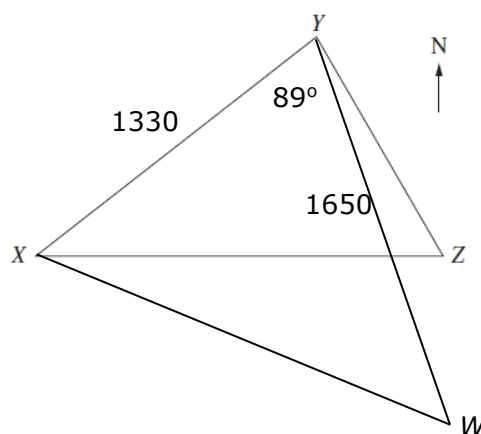
$$XZ = \frac{1330}{\cos 51^\circ}$$

$$= 2113.39092\dots$$

$$= 2113 \text{ (nearest whole)}$$

\therefore the distance is 2113 km.

(c) Let W = pilot's turning point.



Let x = distance XW :

$$x^2 = 1330^2 + 1650^2 - 2(1330)(1650)\cos 89^\circ$$

$$x = 2101.142877\dots$$

$$= 2101 \text{ (nearest whole)}$$

$\therefore XW = 2101$ km and $XZ = 2113$ km.

\therefore the pilot's turning point is closer to town X.

* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

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