

U2D10_T Cosine Law Apps

Sunday, March 4, 2018 1:33 PM



U2D10_T
Cosine La...

Unit 2 Day 10: Cosine Law Applications

Review Cosine Law:

The Cosine Law can be used to solve for an unknown side, if you are given two sides and a contained angle:

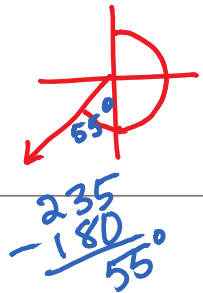
$$a^2 = b^2 + c^2 - 2bc \cos A$$

It can also be re-arranged to solve for an unknown angle:

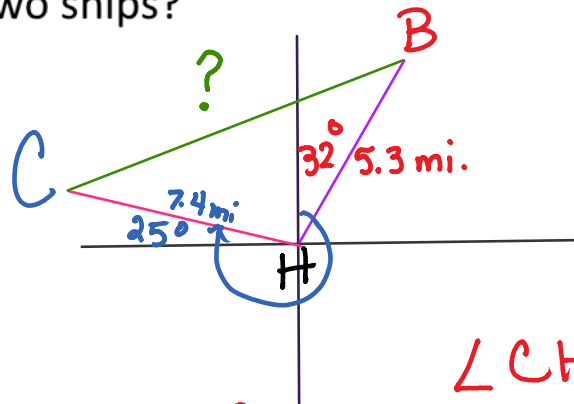
$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Bearings: Direction can be written in several ways

Direction	bearing	Diagram			
N60°E	060°				
Diagram	Bearing	Direction	Diagram	Bearing	Direction
	048°	N48°E		240°	S60°W
	180° - 40° = 140°	S40°E	Provide a sketch here.	235°	S55°W

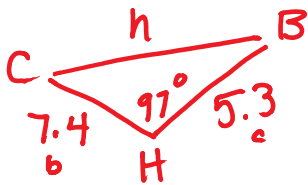


1. A harbour master uses radar to monitor two ships. B and C, as they approach the harbour, H. One ship is 5.3 miles from the harbour on a bearing of 032° . The other ship is 7.4 miles away from the harbour on a bearing of 295° . How far apart are the two ships?



$$90^\circ - 25^\circ = 65^\circ$$

$$\begin{aligned} \angle CHB &= 65^\circ + 32^\circ \\ &= 97^\circ \end{aligned}$$



$$h^2 = b^2 + c^2 - 2bc \cos H$$

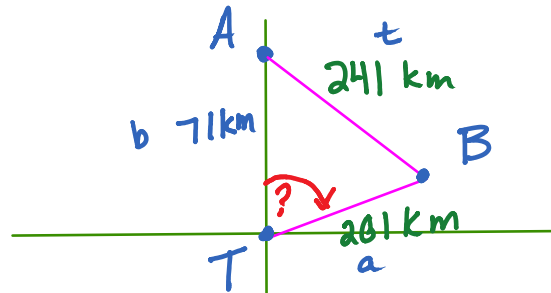
$$h^2 = 7.4^2 + 5.3^2 - 2(7.4)(5.3)\cos 97^\circ$$

$$h^2 = 92.4094313\dots$$

$$h \approx 9.6$$

\therefore the two ships are about 9.6 miles apart.

2. An aircraft navigator knows that town A is 71 km due north of the airport, town B is 201 km from the airport, and towns A and B are 241 km apart. On what bearing should she plan the course from the airport to town B?



$$\cos T = \frac{a^2 + b^2 - t^2}{2ab}$$

$$\cos T = \frac{201^2 + 241^2 - 71^2}{2(201)(241)}$$

$$\cos T = \frac{-12639}{28542}$$

$$T = \cos^{-1}(-0.44282)$$

$$T \doteq 116^\circ$$

∴ Town B is on a bearing of 116° from the airport.

U2D10 Practice: page 110 # 7b, 9,10,11,12