

5.6 The Sine Law

- **Space Station To Study Weird Thundercloud Emissions | Video :**
- https://www.youtube.com/watch?v=B0Z_d6H15oI

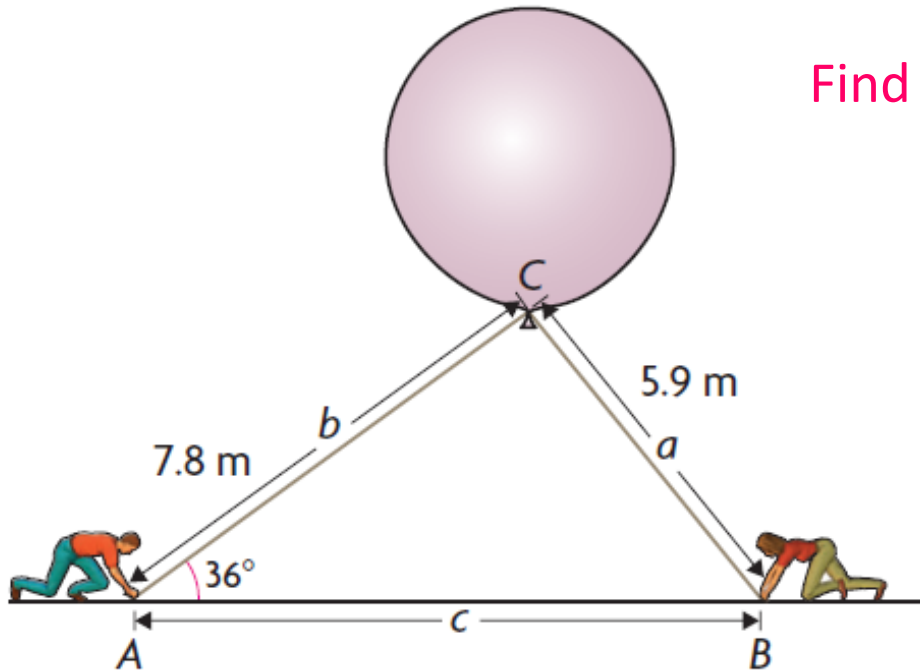


Example #1



Albert and Belle are part of a scientific team studying thunderclouds. The team is about to launch a weather balloon into an active part of a cloud. Albert's rope is 7.8m long and makes an angle of 36° with the ground. Belle's rope is 5.9m long.

- How far, to the nearest tenth of a metre, is Albert from Belle?



Find Angle B, then find Angle C, then find side c.

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$
$$\frac{5.9}{\sin 36^\circ} = \frac{7.8}{\sin B}$$

Ex. #1 cont'd

$$\frac{5.9}{\sin 36^\circ} = \frac{7.8}{\sin B}$$

$$(\sin 36^\circ \times \sin B) \left(\frac{5.9}{\sin 36^\circ} \right) = (\sin 36^\circ \times \sin B) \left(\frac{7.8}{\sin B} \right)$$

$$\frac{(\sin B)(5.9)}{5.9} = \frac{(\sin 36^\circ)(7.8)}{5.9}$$

$$\angle B = \sin^{-1} \left(\frac{(\sin 36^\circ)(7.8)}{5.9} \right)$$

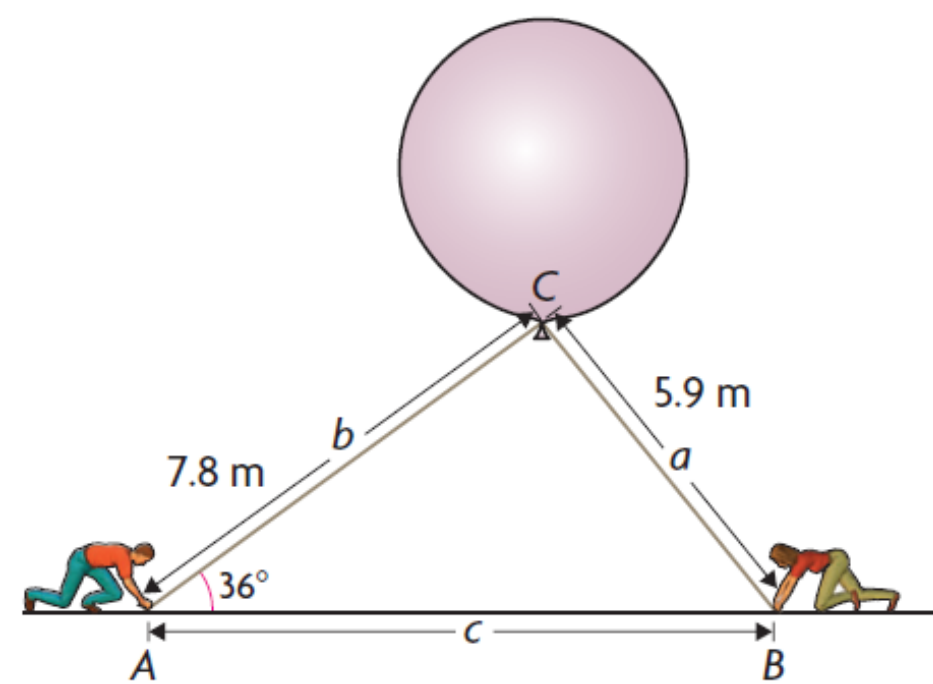
$$\angle B \doteq 51^\circ$$

$$\angle A + \angle B + \angle C = 180^\circ$$

$$36^\circ + 51^\circ + \angle C = 180^\circ$$

$$\angle C = 180^\circ - (36^\circ + 51^\circ)$$

$$= 93^\circ$$



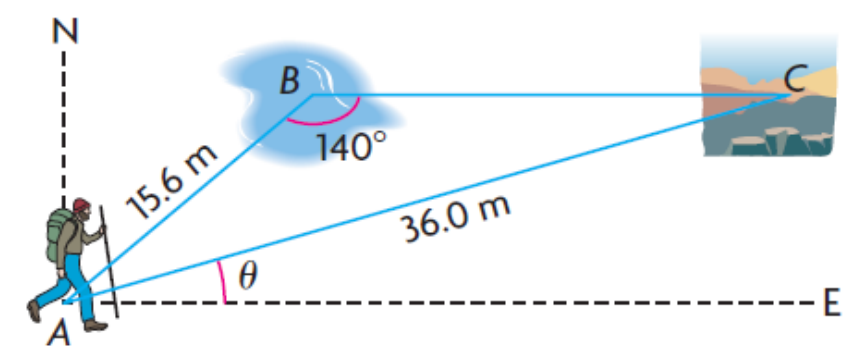
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\frac{5.9}{\sin 36^\circ} = \frac{c}{\sin 93^\circ}$$

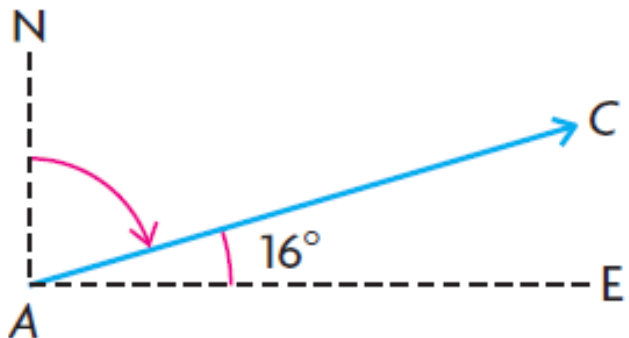
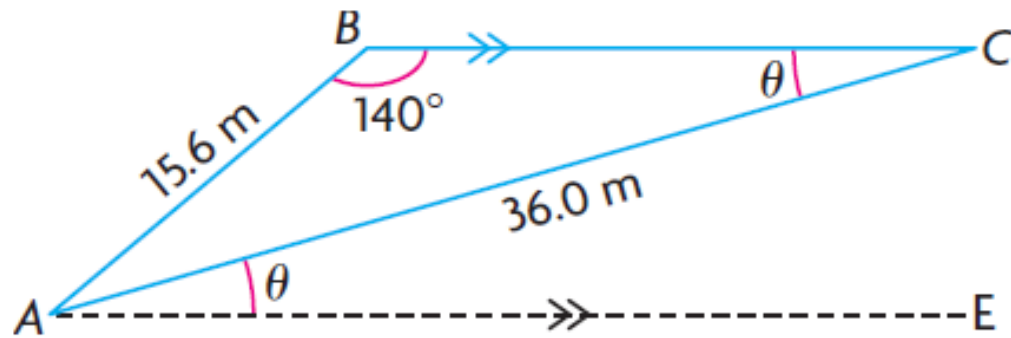
$$\frac{5.9}{\sin 36^\circ} \times \sin 93^\circ = \frac{c}{\sin 93^\circ} \times \sin 93^\circ$$

$$10.0 \text{ m} \doteq c$$

Example #2



- Karl's campsite is 15.6m from a lake that is 36.0m from a scenic lookout as shown. From the lake, the angle formed between the campsite and the lookout is 140° . Karl starts hiking from his campsite to go to the lookout. What is the **bearing** of the lookout from Karl's position? (Angle NAC)



$$\begin{aligned} \angle NAC &= 90^\circ - 16^\circ \\ &= 74^\circ \end{aligned}$$

$$\frac{\sin C}{c} = \frac{\sin B}{b}$$

$$\frac{\sin \theta}{15.6} = \frac{\sin 140^\circ}{36.0}$$

$$15.6 \times \frac{\sin \theta}{15.6} = 15.6 \times \frac{\sin 140^\circ}{36.0}$$

$$\theta = \sin^{-1}\left(\frac{(15.6)(\sin 140^\circ)}{36.0}\right)$$

$$\theta \doteq 16^\circ$$

In Summary...

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \text{or} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

