

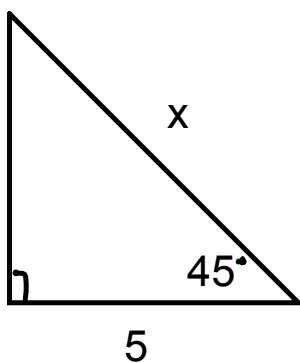
# Cosine Law

Goal:

- to review the trig ratios
- to review sine law
- to use the cosine law to solve triangles

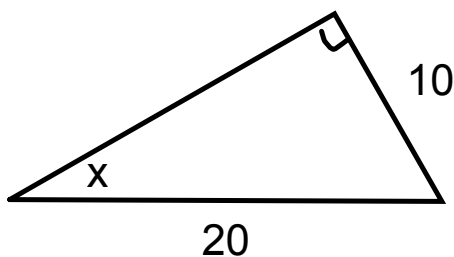
Determine the missing measure in the following:

SOHCAHTOA for right triangles



$$\cos 45^\circ = \frac{5}{x}$$

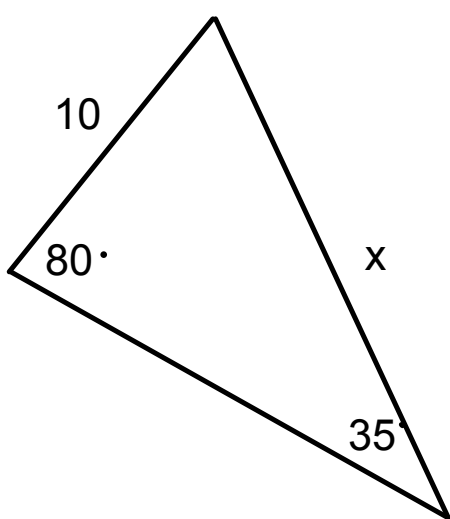
$$x = \frac{5}{\cos 45^\circ} = 7.07 \text{ units}$$



$$\sin x = \frac{10}{20}$$

$$x = \sin^{-1}\left(\frac{10}{20}\right)$$

$$x = 30^\circ$$



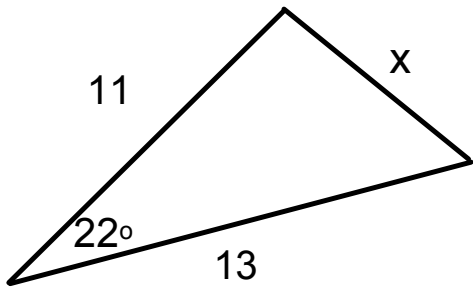
SINE LAW is for all triangles

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

$$\frac{10}{\sin 35^\circ} = \frac{x}{\sin 80^\circ}$$

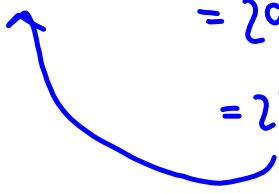
$$x = \frac{10 \sin 80^\circ}{\sin 35^\circ} = 17.2 \text{ units}$$

$$\frac{x}{\sin 22^\circ} = \frac{11}{\sin ?} \quad \times$$

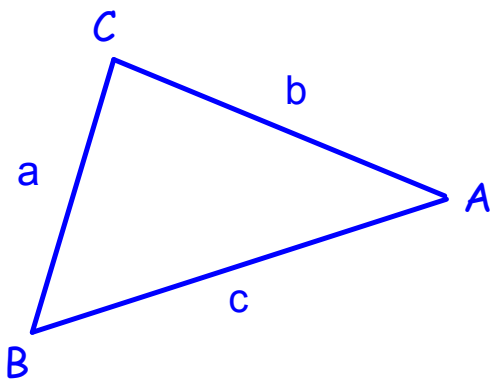


$$\begin{aligned} x^2 &= 13^2 + 11^2 - 2(11)(13)\cos 22^\circ \\ &= 169 + 121 - 286\cos 22^\circ \\ &= 290 - 286\cos 22^\circ \\ &= 290 - 265.17 \\ &= 24.83 \end{aligned}$$

$$\begin{aligned} x &= \sqrt{24.83} \\ x &= 4.98 \end{aligned}$$



The cosine law is:



$$c^2 = a^2 + b^2 - 2ab\cos C$$

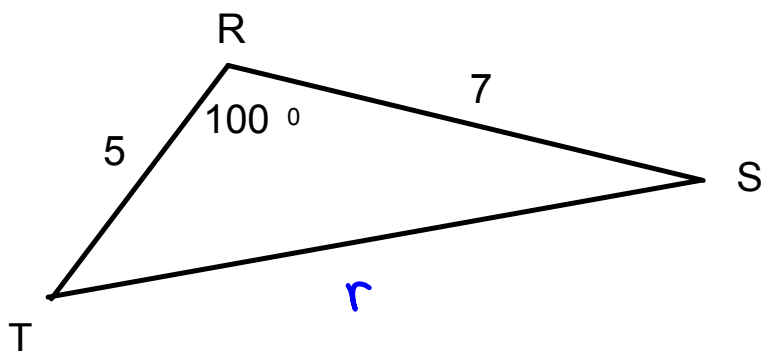
or

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

or

$$b^2 = a^2 + c^2 - 2ac\cos B$$

Solve the following triangles.



$$r^2 = 5^2 + 7^2 - 2(5)(7)\cos 100^\circ$$

$$= 86.16$$

$$r = \sqrt{86.16}$$

$$r = 9.28$$

$$m\angle T = 180^\circ - (100^\circ + 32^\circ)$$

$$= 48^\circ$$

$$\frac{5}{\sin x} = \frac{9.28}{\sin 100^\circ}$$

$$\sin x = \frac{5 \sin 100^\circ}{9.28}$$

$$\sin x = 0.531$$

$$x = \sin^{-1}(0.531)$$

$$= 32^\circ$$

