

## Warm Up

1. Solve this proportion:

$$\frac{0.32}{8} = \frac{0.81}{b}$$

$$b = 20.25$$

2. If two angles of a triangle measure
- $70^\circ$
- and
- $81^\circ$
- , find the measure of the third angle.

3. Solve for C:
- $0.1310 = \cos C$

$$\cos^{-1} 0.1310 = C$$

$$82.5^\circ \approx C$$

## The Law of Sines and Law of Cosines

Law of Sines -

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

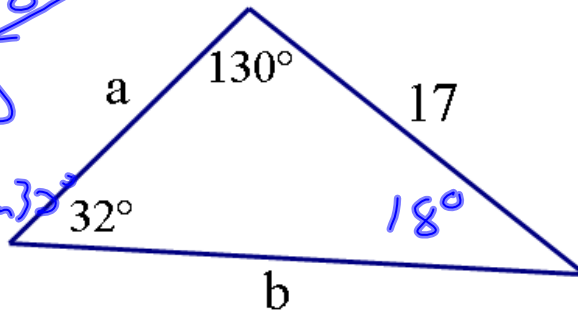
Ex 1 Solve for  $a$  and  $b$ .

$$\frac{\sin 32^\circ}{17} = \frac{\sin 18^\circ}{a}$$

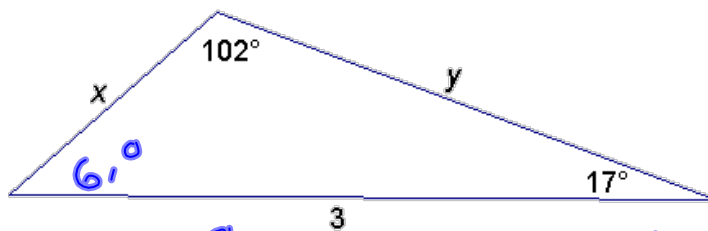
$$17 \cdot \sin 18^\circ = a \sin 32^\circ$$

$$a \approx 9.9$$

$$\frac{\sin 32^\circ}{17} = \frac{\sin 130^\circ}{b} \quad b \approx 24.6$$



Ex 2 Solve for  $x$  and  $y$ .



$$\frac{\sin 102^\circ}{3} = \frac{\sin 17^\circ}{x}$$

$$x \approx .896$$

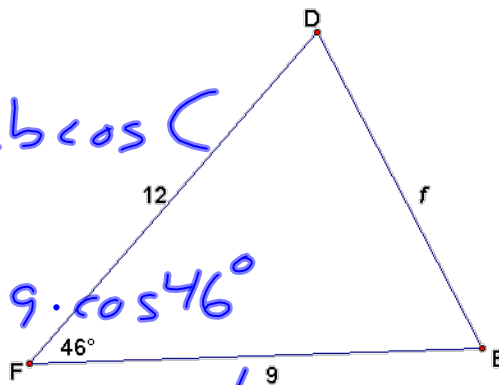
$$\frac{\sin 102^\circ}{3} = \frac{\sin 61^\circ}{y}$$

$$y \approx 2.7$$

Ex 3 Solve for  $f$ .

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

$$f^2 = 12^2 + 9^2 - 2 \cdot 12 \cdot 9 \cdot \cos 46^\circ$$



$$f^2 = 74.95$$

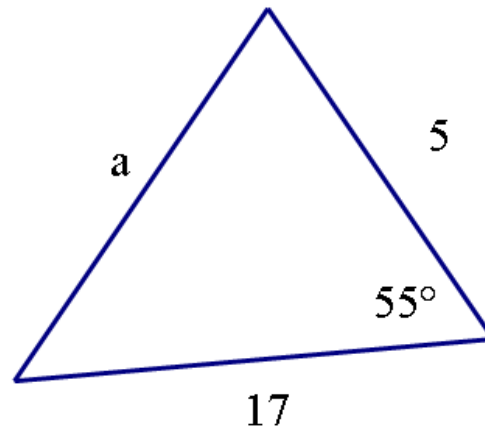
$$f \approx 8.65$$

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

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

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

Ex. 4 Solve for  $a$ .

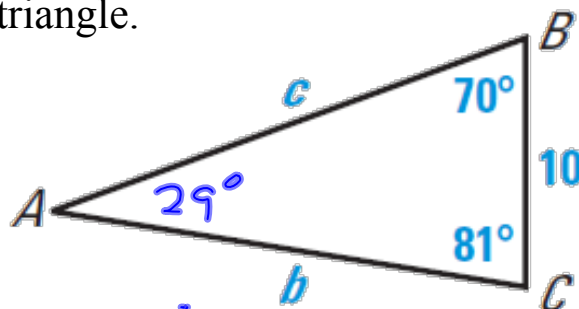


$$a^2 = 5^2 + 17^2 - 2 \cdot 5 \cdot 17 \cdot \cos 55^\circ$$

$$a^2 \approx 216.49$$

$$a \approx 14.7$$

Ex. 5 Solve the triangle.



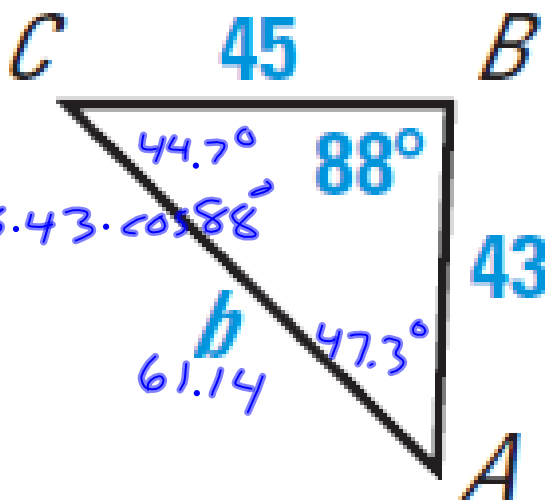
$$\frac{\sin 29^\circ}{10} = \frac{\sin 70^\circ}{b}$$

$$b \approx 19.4$$

$$\frac{\sin 81^\circ}{c} = \frac{\sin 29^\circ}{10}$$

$$c \approx 20.4$$

Ex. 6 Solve the triangle.



$$b^2 = 45^2 + 43^2 - 2 \cdot 45 \cdot 43 \cdot \cos 88^\circ$$

$$b \approx 61.14$$

$$\frac{\sin 88^\circ}{61.14} = \frac{\sin A}{45}$$

$$\sin^{-1} \left( \frac{61.14 \cdot \sin 88^\circ}{45} \right) = \sin^{-1} \sin A$$

$$A \approx 47.3^\circ$$