

Trigonometry: The Law of Sines

The LAW OF SINES is a powerful triangle tool which is used to find missing **sides** or **angles** of ANY triangle. By matching up angles with their **opposite sides**, the equation is:

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

Example: Find the missing side x:

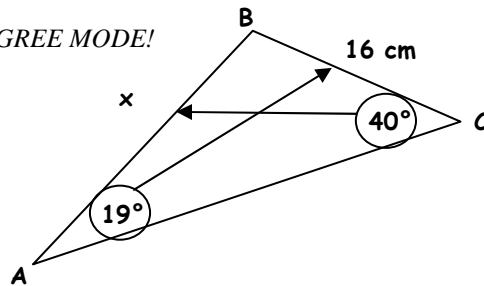
How about finding the other unknowns?

$$\frac{\sin 19^\circ}{16} = \frac{\sin 40^\circ}{x} \text{ DEGREE MODE!}$$

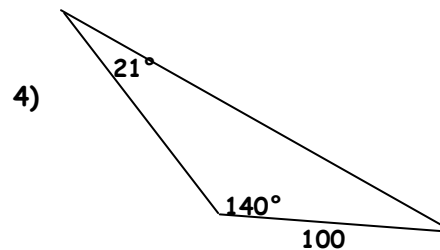
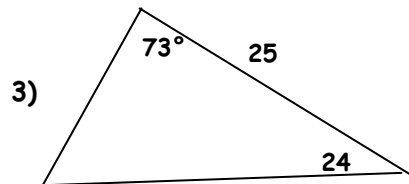
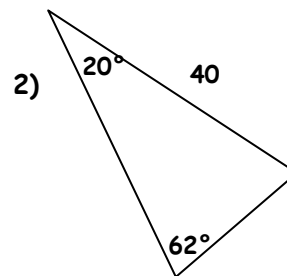
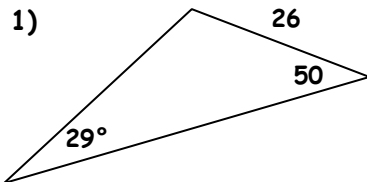
$$\frac{.326}{16} = \frac{.643}{x}$$

$$.326x = 10.288$$

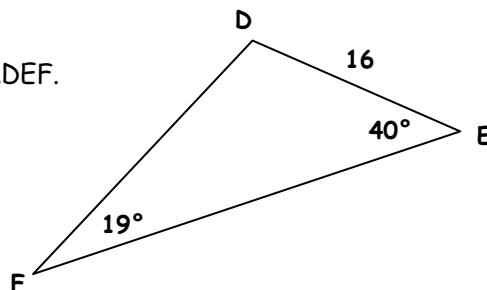
$$x = 31.56 \text{ cm}$$



Solve each triangle:



5) Find the perimeter of $\triangle DEF$.



The **LAW OF SINES** can also be used to find missing angles.

Example: Find the missing angle x :

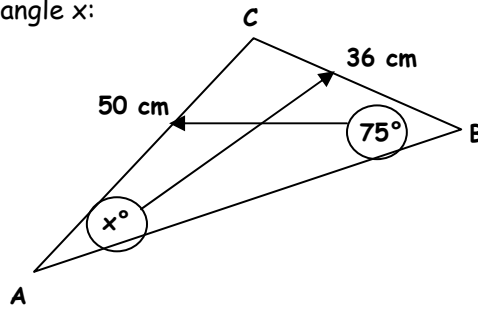
$$\frac{\sin x^\circ}{36} = \frac{\sin 75^\circ}{50}$$

$$\frac{\sin x^\circ}{36} = \frac{.966}{50}$$

$$50(\sin x^\circ) = 34.776$$

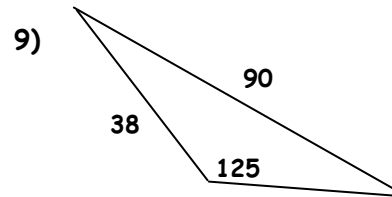
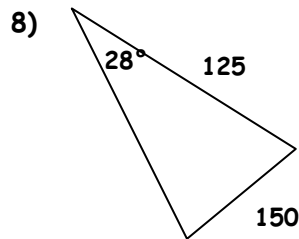
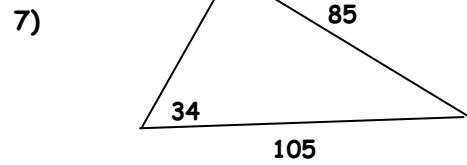
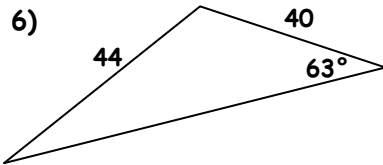
$$\sin x^\circ = .69532$$

$$x = 44^\circ \text{ (using inverse sine on your calculator)}$$



What about the other unknowns?

Solve each triangle:



10) Find the area of circle C by using the Law of Sines to find the radius. **Hint:** What kind of triangle is ABC?

