Title of Lesson: The Law of Sines and the Law of Cosines

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

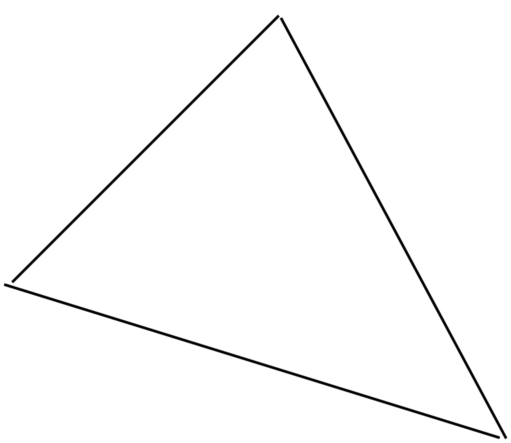
$$a^2 = b^2 + c^2 - 2bc \cdot \operatorname{Cos}(A)$$
$$b^2 = a^2 + c^2 - 2ac \cdot \operatorname{Cos}(B)$$
$$c^2 = a^2 + b^2 - 2ab \cdot \operatorname{Cos}(C)$$

By the end of this lesson, I will be able to answer the following questions…

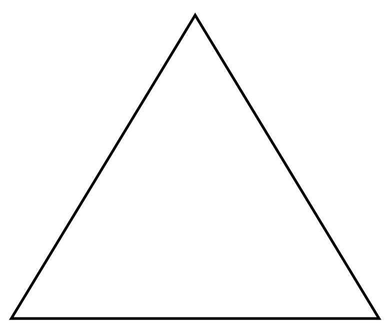
1. How do I use the NEW SCHOOL SUPER TERRIFIC way to calculate the area of a triangle?
2. How do we use that NSST formula to derive the Law of Sines?
3. How do I use the Law of Sines? What are its pitfalls?
4. What is the Law of Cosines and how do I use it?

Prerequisite Skills with Practice

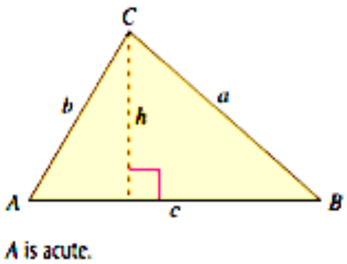
Labeling a triangle correctly for problem solving.

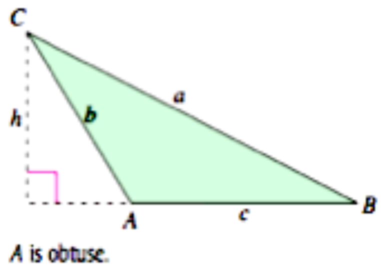


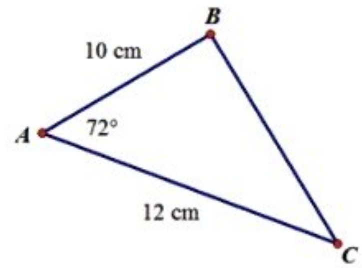
Area of an equilateral triangle.



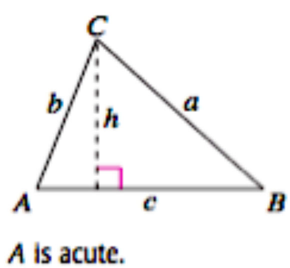
Finding the area of a triangle in a whole new way….

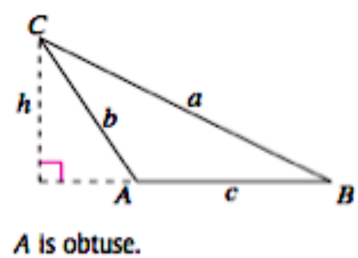






Deriving the Law of Sines from the New School Area formula.

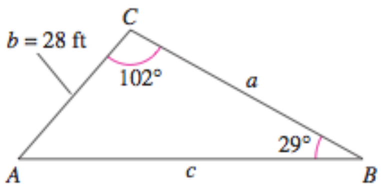


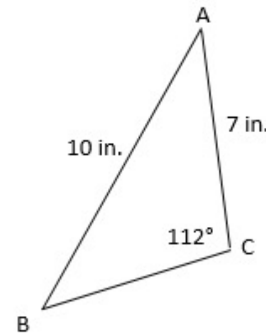


$$\frac{1}{2}ab \cdot \sin(C) = \frac{1}{2}bc \cdot \sin(A) = \frac{1}{2}ac \cdot \sin(B)$$

Using the Law of Sines

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





None, One or Two Triangles.

Solve the triangle ABC if

$A = 43^o$

$a = 81$

$b = 62$

Solve the triangle ABC if

$A = 75^o$

$a = 26$

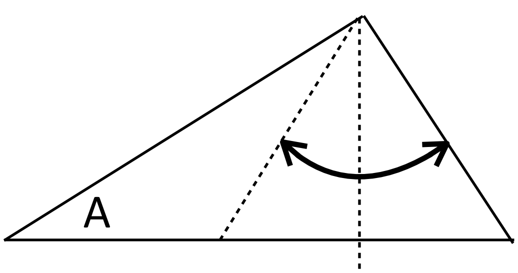
$b = 51$

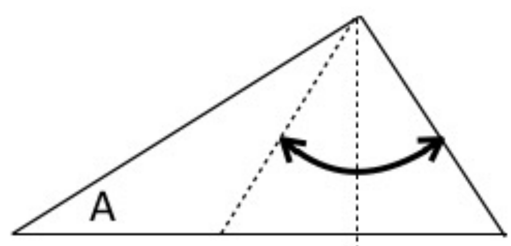
Solve the triangle ABC if

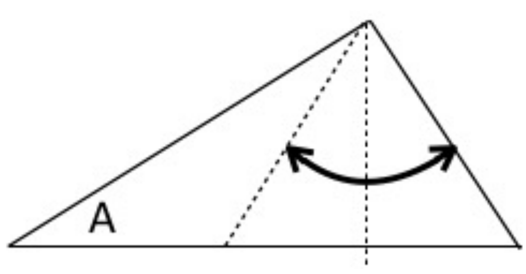
$A = 40^o$

$a = 54$

$b = 62$



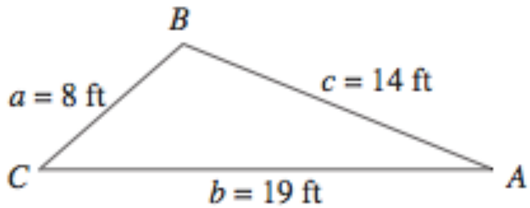


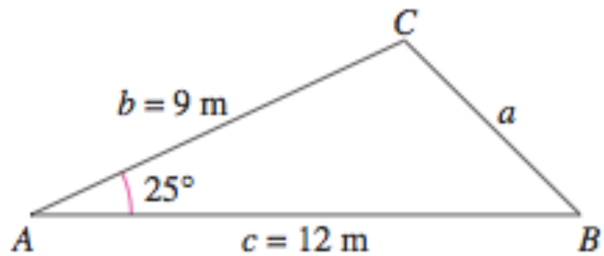


Using the Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cdot Cos(A)$$
$$b^2 = a^2 + c^2 - 2ac \cdot Cos(B)$$
$$c^2 = a^2 + b^2 - 2ab \cdot Cos(C)$$

NOTE! WHEN SOLVING A TRIANGLE WITH ALL SIDES GIVEN….. **GO AFTER THE LARGEST ANGLE FIRST**





LENGTH A 100-foot vertical tower is to be erected on the side of a hill that makes a 6° angle with the horizontal (see figure). Find the length of each of the two guy wires that will be anchored 75 feet uphill and downhill from the base of the tower.