In non-right triangles we cannot use the primary trigonometric ratio; there is no 90° angle, so there is no hypotenuse!

However, there still exists relationships between the sides and the angles in the triangle.

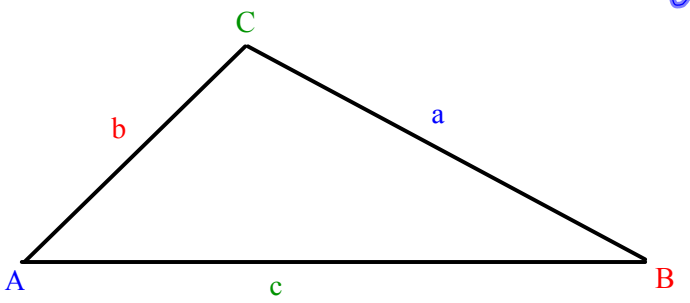
The relationships can be expressed in terms of sine or cosine and are called the Sine Law and the Cosine Law.

We will study these laws over the next few days.

May 13-1:31 PM

The Sine Law

May 18/2011



The Sine Law (2 formats) for Δ ABC:

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

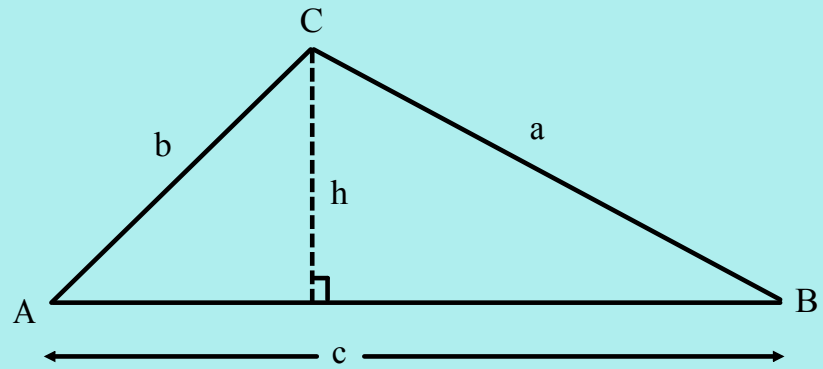
or

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

You decide which format to use depending on what you are solving for.

May 15-2:45 PM

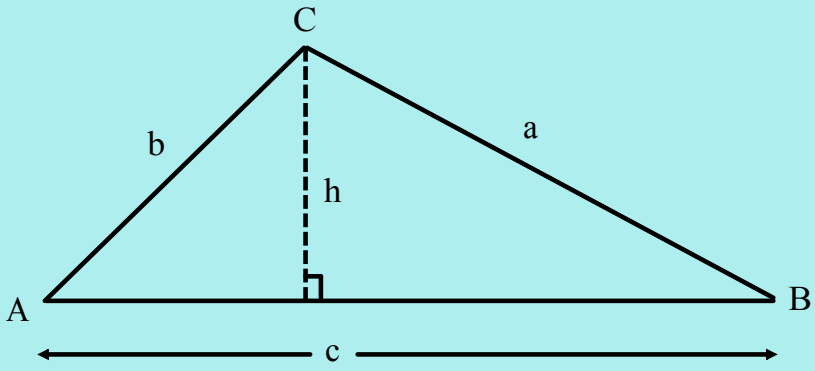
Proving the SINE LAW:



We can always create right triangles by drawing an altitude from any vertex.

Using trigonometry on each right triangle, we can relate the angles and sides of the overall triangle.

May 14 - 9:32 PM



$$\sin A = \frac{h}{b} \qquad \sin B = \frac{h}{a}$$

$$b\sin A = h \qquad a\sin B = h$$

$$set \quad h = h$$

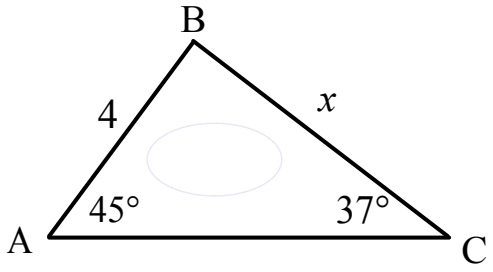
$$b\sin A = a\sin B$$

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

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

May 14 - 9:32 PM

Ex1: Solve for x.



want side length (x)

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

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

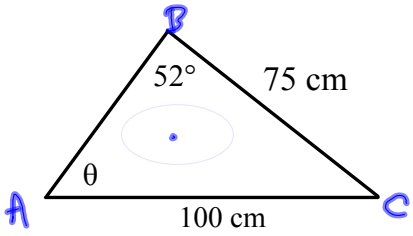
$$\frac{x}{\sin 45^\circ} = \frac{4}{\sin 37^\circ} \quad [\times \sin 45^\circ]$$

$$x = \frac{4 \sin 45^\circ}{\sin 37^\circ}$$

$$x \doteq 4.7$$

May 15-2:57 PM

Ex 2: Solve for θ.



want angle:

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

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

$$\frac{\sin \theta}{75} = \frac{\sin 52^\circ}{100} \quad [\times 75]$$

$$\sin \theta = \frac{75 \sin 52^\circ}{100}$$

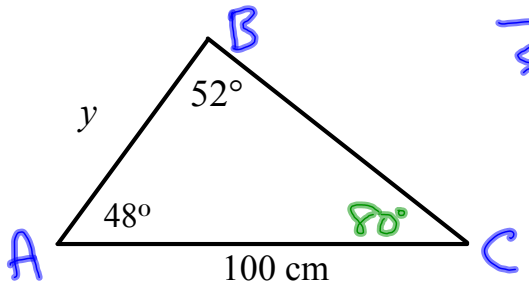
$$\theta = \sin^{-1}\left(\frac{75 \sin 52^\circ}{100}\right)$$

$$\theta = \sin^{-1}(0.591)$$

$$\theta = 36.2^\circ$$

Dec 13-10:20 PM

Ex 3: Solve for y.



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

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

$$\frac{100}{\sin 52^\circ} = \frac{y}{\sin 80^\circ}$$

$$\frac{100 \sin 80^\circ}{\sin 52^\circ} = y$$

$$y \doteq 125 \text{ cm}$$

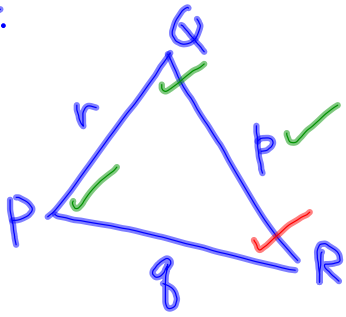
Jan 4-2:58 PM

Assigned Work:

p. 427 #1a, 2ac, 3
p. 432 - 434 #2, 3c, 6, 14, 15

May 14 - 9:42 PM

14.



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

$$\frac{p}{\sin P} = \frac{Q}{\sin Q} = \frac{r}{\sin R}$$

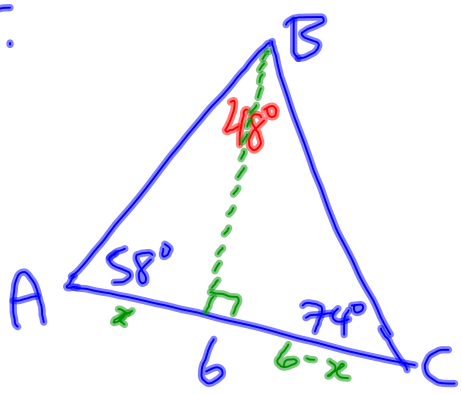
q → sine law

R → sum of Δ is 180°

r → sine law

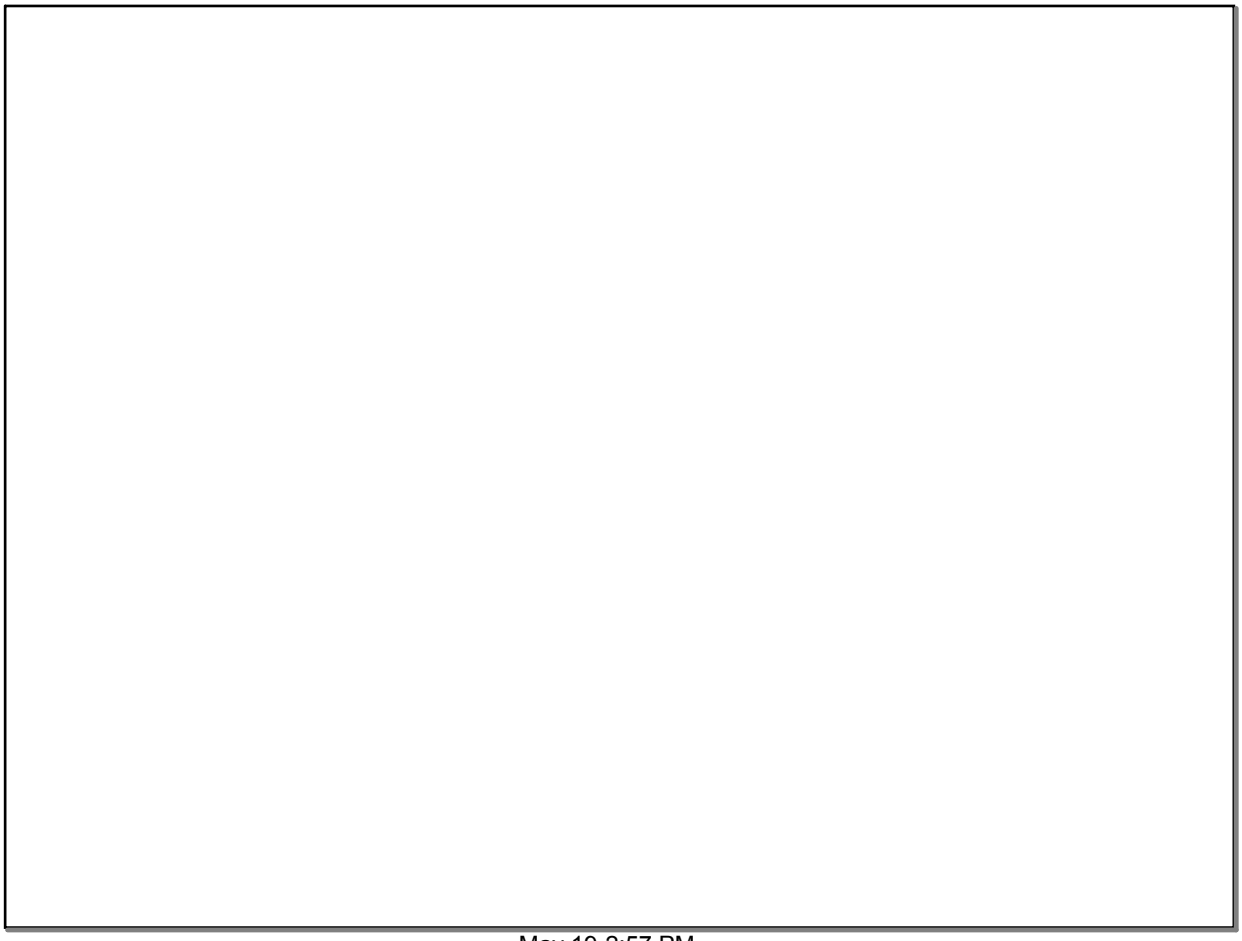
May 19-1:57 PM

15.



$$\text{Area} = \frac{bh}{2}$$

May 19-2:01 PM



May 19-2:57 PM