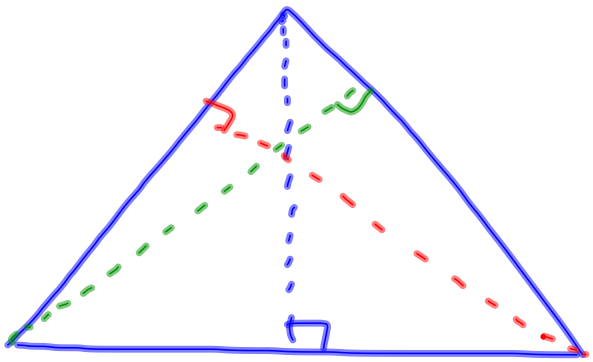
In non-right triangles we cannot use the primary trigonometric ratio; there is no 90° angle, so there is no hypotenuse!

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.

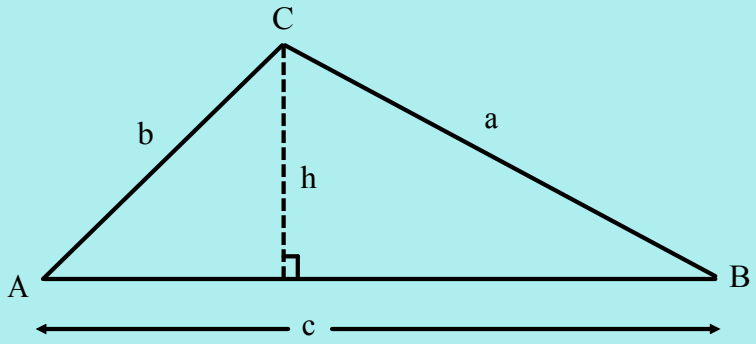
We will study these laws over the next few days.

May 13-1:31 PM



Dec 14-11:01 AM

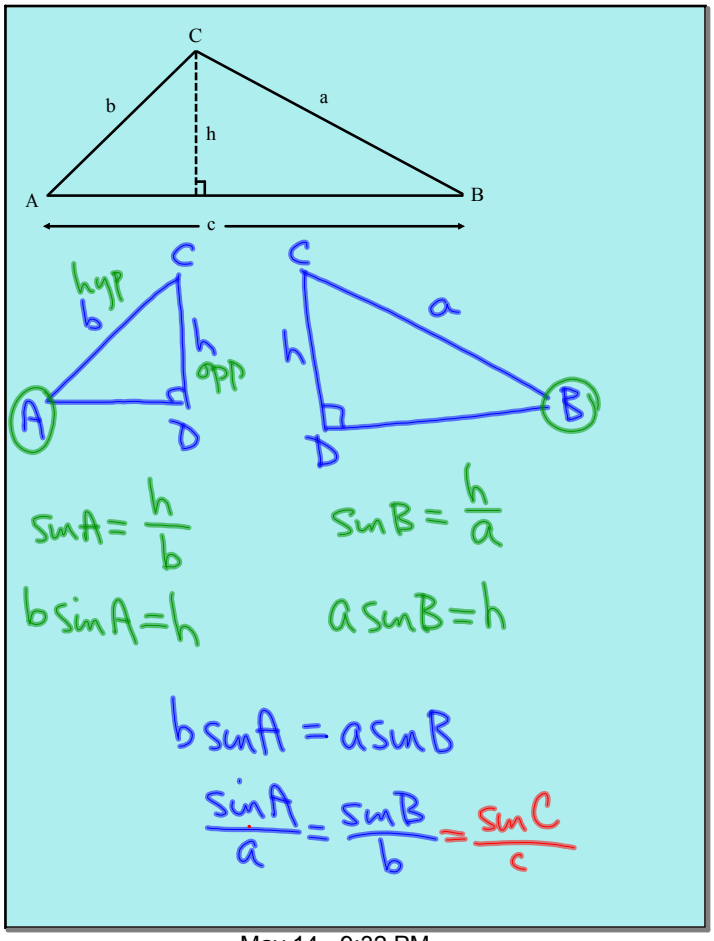
Proving the Sine Law:



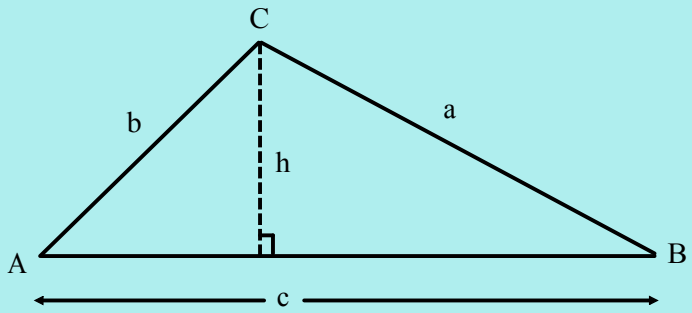
We can always create right triangles by drawing an altitude from any vertex.

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

May 14 - 9:32 PM



May 14 - 9:32 PM



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

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

$$set \quad h = h$$

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

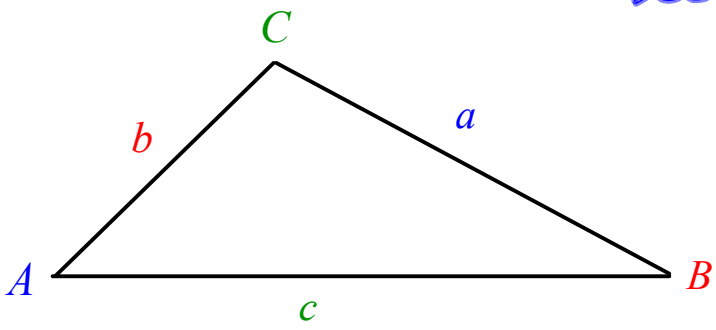
$$\frac{b\sin A}{a} = \sin B$$

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

May 14 - 9:32 PM

The Sine Law

Dec 14/2011



The Sine Law (2 formats) for Δ ABC:

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

finding angle

or

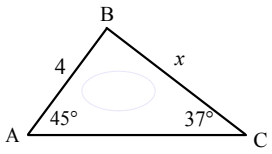
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

finding side

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

May 15-2:45 PM

Ex.1 Solve for x.



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

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

$$x \sin 37^\circ = 4 \sin 45^\circ$$

$$x(0.6018) \doteq 4(0.7071)$$

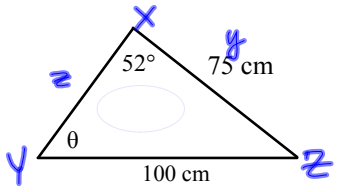
$$x \doteq \frac{4(0.7071)}{(0.6018)}$$

$$x \doteq 4.6999$$

$$\boxed{x \doteq 4.7}$$

May 15-2:57 PM

Ex. 2 Solve for θ.



$$\frac{\sin X}{x} = \frac{\sin Y}{y} = \frac{\sin Z}{z}$$

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

$$100(\sin \theta) = 75 \sin 52^\circ$$

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

$$\sin \theta \doteq 0.5910$$

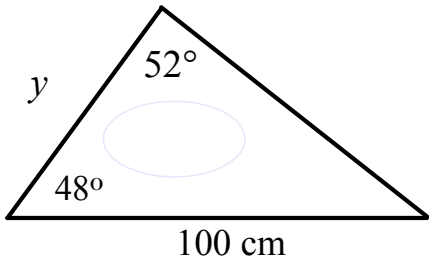
$$\theta \doteq \sin^{-1}(0.5910)$$

$$\boxed{\theta \doteq 36.2^\circ}$$

θ	$\sin\theta$
15	0....
16	0.—
17	0.—
18	0.—

Dec 13-10:20 PM

Ex. 3 Solve for y.



Jan 4-2:58 PM

Assigned Work:

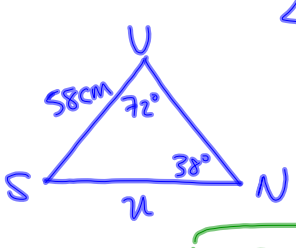
p.427 # 2ac
p.432 # 2, 3ace, 5ac, 6, 14, 15

May 14 - 9:42 PM

p. 432

5(a) ΔSUN $n = 58$ cm $\angle U = 72°$

$\angle N = 38°$



$$\frac{s}{\sin S} = \frac{u}{\sin U} = \frac{n}{\sin N}$$

$$\frac{u}{\sin 72°} = \frac{58}{\sin 38°}$$

$$\frac{u(\sin 38°)}{\sin 38°} = \frac{58 \sin 72°}{\sin 38°}$$

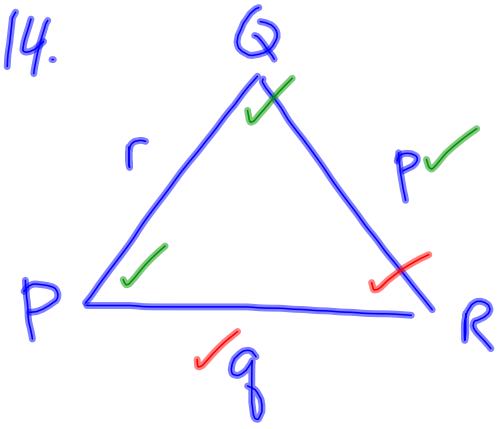
$$u = \frac{58 \sin 72°}{\sin 38°}$$

$$u \doteq 89.6 \text{ cm}$$

$$\frac{\sin 72°}{\sin 38°} = \sin\left(\frac{72°}{38°}\right)$$

Dec 15-9:11 AM

14.

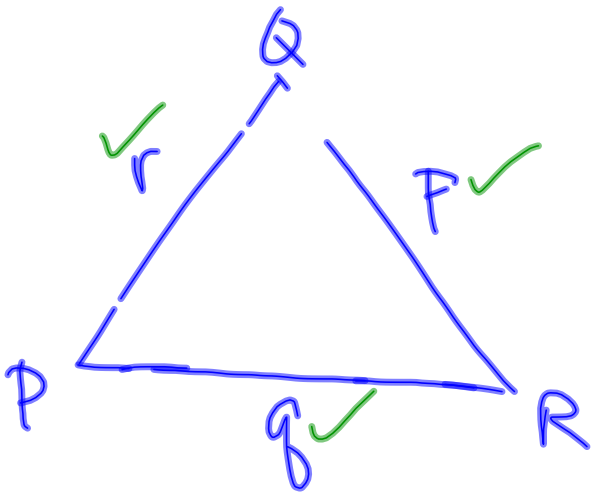


① $q \rightarrow$ Sine law

① $\angle R \rightarrow$ Sum of angles

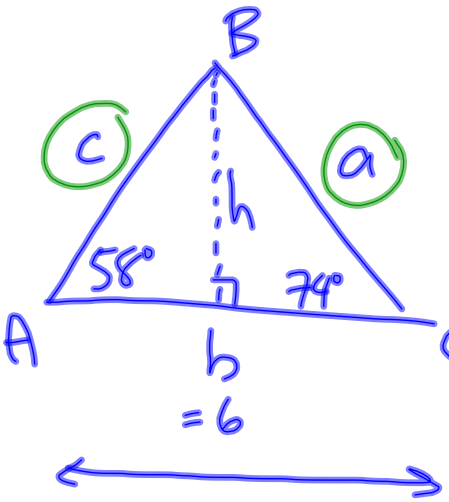
② $r \rightarrow$ Sine law

Dec 15-9:19 AM



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

Dec 15-9:19 AM



$$A = \frac{1}{2} b \times h$$

$$= \frac{b \times h}{2}$$

① use sine law to find a or c

② use trig to find h.

③ calculate Area.

Dec 15-9:25 AM