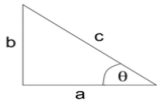
Right Triangle Trigonometry

***********In Physics the calculator must be set in degree mode.***********

In this Physics course the trigonometry used is the standard right triangle trig learned in geometry.
For the triangle



$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{b}{c}$ $\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse}} = \frac{a}{c}$ $\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{b}{a}$

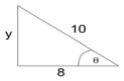
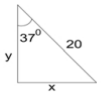
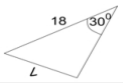
Pythagorean Theorem is also useful: $a^2 + b^2 = c^2$. In addition all angles in a triangle add to a total of 180°

Given a right triangle and two sides or one side and an angle, you must be able to find all other sides and all other angles. Students seem to have very little problem with the standard right triangle shown above. However, the triangles in Physics will be in a variety of orientations and you must become adept at using trig for all situations, like those in "g" to "i" below. There are some special triangles worth knowing. If you see a right triangle with an angle of 37° or 53° these are 3, 4, 5 triangles. Using your trig with these angles does not come out to 3, 4, 5 exactly, but the AP test allows you to round off to 3, 4, 5. Conversely, if the ratio of the side is 3, 4, 5 then you can conclude the angles are 37° or 53° . In these triangles you can use ratios and proportions to solve rather than trig.

Another triangle worth knowing is a 30° 60° 90° triangle. Here memorizing that sin30° = 0.5 and cos60° = 0.5 is valuable.

The most used triangles in the class are 3, 4, 5 and 30° 60° 90°. Knowing these short cuts are a time saver.

Problem Set: In "a" through "e" use the generic triangle above, trig functions and the Pythagorean Theorem to solve the following.

Given	Solve for			
Example θ = 55°, c = 32 m	$\cos 55^\circ = \frac{a}{32}$	a = 18.4 m	$\sin 55^\circ = \frac{a}{32}$	b = 26.2m
a. b=17.8 m, θ=65°		a =		c =
b. a=25 cm, c=32 cm		b =		θ =
c. θ=45°, a=15 m/s		b =		c =
d. a=250 m, b=180 m		θ =		c =
e. b=65 cm, 104 cm		a =		θ =
In the remaining parts, use the given triangle to solve for the desired quantity				
Given	**Solve for**			
f. 	y =			
g. 	x = y =			
h. 	L =			