

The prerequisites for physics include algebra, geometry, and trigonometry, so I expect math not to be a problem for people in this class. However, some people may have met the prerequisites a long time ago and/or may have forgotten some things. The following list is an attempt to pick out a few key ideas which students have been 'rusty' on in the past in the hopes that you will review areas where you might be slowed down by lack of math competence. All these should be 'basic' for you. Work examples and seek help if you have any problems.

1. Simple 1 variable equations...solve for 'x':

$$3x + 27 = 42 \Rightarrow \frac{3x}{3} = \frac{15}{3}$$

$$x = \boxed{5}$$

$$12.7t + 71.0 = 39.1t \quad \frac{71.0}{26.4} = \frac{26.4t}{26.4}$$

$$-12.7t \quad -12.7t$$

$$t = \boxed{2.69}$$

2. Proportions

$$500 \cdot \frac{x}{5.00} = \frac{17.0}{21.0} \cdot 5.00$$

$$x = \boxed{4.05}$$

$$\frac{1.00}{t} = \frac{36.2}{49.7}$$

$$\frac{t}{1.00} = \frac{49.7}{36.2}$$

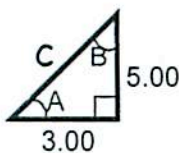
$$t = \boxed{1.37}$$

$$y \cdot \frac{27.8}{27.8} = \frac{16.2}{27.8} \cdot 27.8$$

$$\frac{27.8y}{27.8} = \frac{16.2}{27.8}$$

$$y = \boxed{0.583}$$

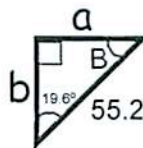
3. Trigonometry, triangles, etc. (For more on this, see other side). Determine all missing sides and angles. Show work below or on your own paper. Such work must be shown for full credit.



$$\angle A = \frac{59.0^\circ}{\tan^{-1}(\frac{5}{3})} = \angle A$$

$$\angle B = \frac{31.0^\circ}{\tan^{-1}(\frac{3}{5})} = \angle B$$

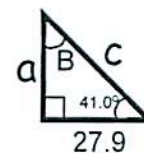
$$C = \frac{\sqrt{34} = 5.83}{\sqrt{3^2 + 5^2}} = C$$



$$a = \frac{18.5}{\sin(19.6^\circ)} = \frac{a}{55.2}$$

$$b = \frac{52.0}{\cos(19.6^\circ)} = \frac{b}{55.2}$$

$$\angle B = \frac{70.4^\circ}{B + 19.6^\circ + 90^\circ = 180^\circ}$$



$$\angle B = \frac{49^\circ}{\angle B + 41^\circ + 90^\circ = 180^\circ}$$

$$a = \frac{24.3}{\tan(41^\circ)} = \frac{a}{27.9}$$

$$C = \frac{37.0}{\tan(41^\circ)}$$

4. Not used as much, but pretty basic. Use the quadratic formula (SHOW work) to solve. (Simplify; $\cos(41^\circ) = \frac{27.9}{C}$)
i.e. use calculator on radicals. Example: $\sqrt{34.0} = 5.83$

$$5.00t^2 + 41.0t - 829 = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-41 \pm \sqrt{41^2 - 4(5)(-829)}}{2 \cdot 5}$$

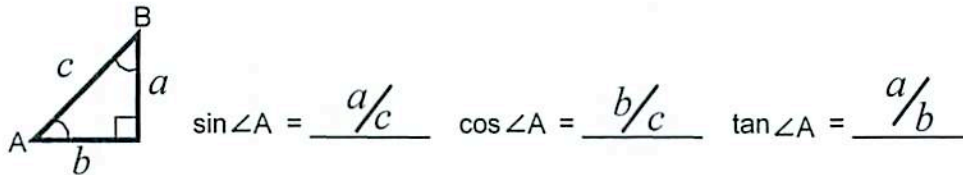
$$t = \boxed{9.41 \text{ or } -17.6}$$

$$3.00x^2 + 7.00 = 2.00x$$

$$x = 0.33 \pm 1.49i$$

Study and practice these if your trigonometry is weak, or just to build speed. These DO NOT need to be done if you choose not to.

1. Recall the definitions of sine (Sin), cosine (Cos) and tangent (Tan) for a right triangle of sides a , b , c .



2. You need to be able to use sine, cosine, and tangent ratios to solve two types of problems, which are shown below. (It is expected that you remember the Pythagorean theorem and can use it as needed.)

Problem Type I: Given 2 sides of a right triangle, determine the angles and the third side.

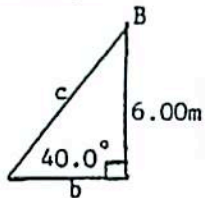
Example: Given $a = 5.00\text{m}$, $b = 3.00\text{m}$, determine c , $\angle A$, $\angle B$

Solution: To get c , recall $c^2 = a^2 + b^2$ Therefore $c = \sqrt{25.0\text{m}^2 + 9.00\text{m}^2}$
 so $c = \sqrt{34.0\text{m}^2} \approx 5.83\text{m}$
 to get $\angle A$, $\angle B$, various functions could be used. For example:

$\tan \angle A = \frac{5.00\text{m}}{3.00\text{m}} = 1.67$ $\angle A = 59.0^\circ$ | $\sin \angle B = \frac{3.00\text{m}}{5.83\text{m}}$ $\angle B = 31.0^\circ$

Problem Type II: Given 1 side and an acute angle, solve the triangle.

Example: Given:



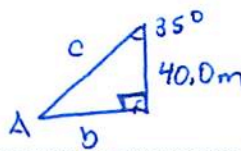
Solution: $\tan 40.0^\circ = \frac{6.00\text{m}}{b}$ $b = \frac{6.00\text{m}}{\tan 40^\circ} = 7.15\text{m}$

$c^2 = a^2 + b^2$, $c = \sqrt{(6.00\text{m})^2 + (7.15\text{m})^2}$, $c = 9.33\text{m}$

Check: $\sin 40.0^\circ = \frac{6.00\text{m}}{9.33\text{m}}$ $c = 9.33\text{m}$ \uparrow o.k.!

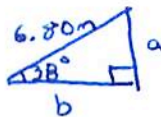
Solve: Put answers here - use triangle ABC at the top for symbol reference, draw a triangle for each problem and label it with the given information.

$a = 40.0\text{m}$ $b = \underline{28.0\text{m}}$
 $\angle B = 35.0^\circ$ $c = \underline{48.8\text{m}}$
 $\angle A = \underline{55^\circ}$



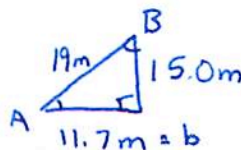
$\tan(35^\circ) = \frac{b}{40\text{m}}$
 $\cos(35^\circ) = \frac{40\text{m}}{c}$
 $\angle A = 180^\circ - 90^\circ - 35^\circ$

$c = 6.80\text{m}$ $a = \underline{4.19\text{m}}$
 $\angle A = 38.0^\circ$ $b = \underline{5.36\text{m}}$
 $\angle B = \underline{52^\circ}$



$\sin(38^\circ) = \frac{a}{6.80\text{m}}$
 $\cos(38^\circ) = \frac{b}{6.80\text{m}}$
 $\angle B = 180^\circ - 90^\circ - 38^\circ$

$a = 15.0\text{m}$ $b = \underline{11.7\text{m}}$
 $c = 19.0\text{m}$ $\angle A = \underline{52.0^\circ}$
 $\angle B = \underline{38^\circ}$



$(19.0\text{m})^2 - (15.0\text{m})^2 = b^2$
 $\tan^{-1}\left(\frac{15.0\text{m}}{11.7\text{m}}\right) = \angle A$
 $\tan^{-1}\left(\frac{11.7\text{m}}{15.0\text{m}}\right) = \angle B$