

**Part A – The following problems will be MULTIPLE-CHOICE on the test.**

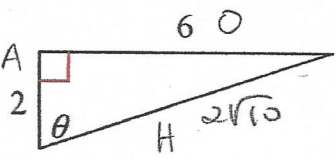
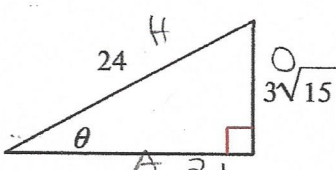
**I. Below is a table of all the vocabulary in this unit.**

1.) Make sure you know all the definitions for all the vocabulary words.

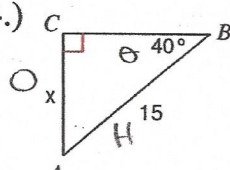
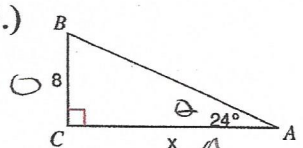
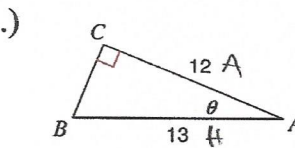
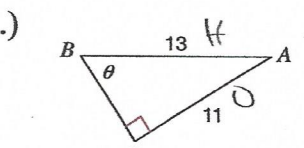
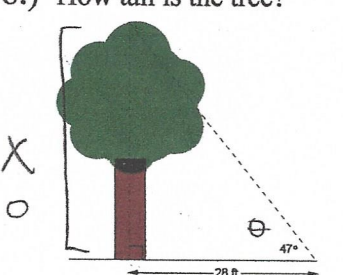
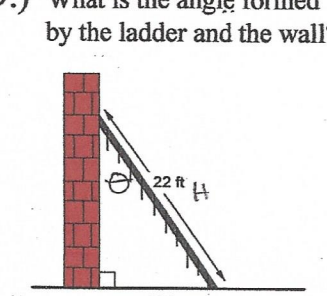
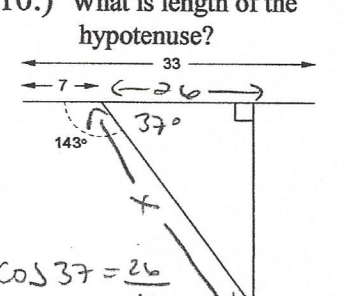
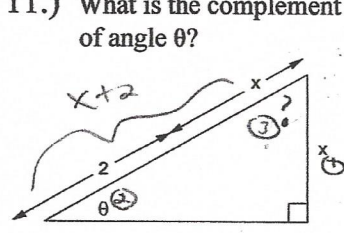
|                    |                    |                     |                      |                       |
|--------------------|--------------------|---------------------|----------------------|-----------------------|
| radical            | Pythagorean Thm    | leg                 | hypotenuse           | right angle           |
| sine               | cosine             | tangent             | Theta                | rationalize den       |
| opposite (side)    | adjacent (side)    | arcsine             | arccosine            | arctangent            |
| solve (a triangle) | angle of elevation | angle of depression | alt. interior angles | capital vs. lowercase |

**II. Complete the table for finding the remaining side and the value of all THREE trig ratios.**

**Make sure your answers are completely simplified in fractional and radical form (No decimals)!**

| Given Right Triangle   | Work to Find Missing Side  | THREE trig ratios for angle $\theta$   |
|--|--|--|
| 2.)   | $6^2 + 2^2 = x^2$<br>$40 = x^2$<br>$x = 2\sqrt{10}$                          | $\sin \theta = \frac{2}{2\sqrt{10}} = \frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$<br>$\cos \theta = \frac{6}{2\sqrt{10}} = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}$<br>$\tan \theta = \frac{2}{6} = \frac{1}{3}$ |
| 3.)  | $(3\sqrt{5})^2 + x^2 = 24^2$<br>$135 + x^2 = 576$<br>$x^2 = 441$<br>$x = 21$ | $\sin \theta = \frac{21}{24} = \frac{7}{8}$<br>$\cos \theta = \frac{24}{24} = 1$<br>$\tan \theta = \frac{21}{24} = \frac{7}{8}$  |

**III. Find value of length x, angle  $\theta$ , or what is asked. Round to tenth place. Must show work!**

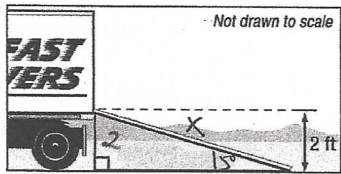
|  |   |   |  |
|--|---|---|--|
| <p>4.) </p> <p><math>\sin 40 = \frac{x}{15}</math><br/><math>x = 15 \sin 40</math><br/><math>x = 9.6</math></p>                        | <p>5.) </p> <p><math>\tan 24 = \frac{8}{x}</math><br/><math>x = \frac{8}{\tan 24}</math><br/><math>x = 18</math></p>   | <p>6.) </p> <p><math>\cos \theta = \frac{12}{13}</math><br/><math>\theta = \cos^{-1}(\frac{12}{13})</math><br/><math>\theta = 20.6^\circ</math></p>         | <p>7.) </p> <p><math>\sin \theta = \frac{11}{13}</math><br/><math>\theta = \sin^{-1}(\frac{11}{13})</math><br/><math>\theta = 57.8^\circ</math></p>   |
| <p>8.) How tall is the tree?</p>  <p><math>\tan 47 = \frac{x}{28}</math><br/><math>x = 28 \tan 47</math><br/><math>x = 30.4</math></p> | <p>9.) What is the angle formed by the ladder and the wall?</p>  <p><math>\sin \theta = \frac{18}{22}</math><br/><math>\theta = \sin^{-1}(\frac{18}{22})</math><br/><math>\theta = 54.9^\circ</math></p> | <p>10.) What is length of the hypotenuse?</p>  <p><math>\cos 37 = \frac{26}{x}</math><br/><math>x = \frac{26}{\cos 37}</math><br/><math>x = 32.6</math></p> | <p>11.) What is the complement of angle <math>\theta</math>?</p>  <p>① <math>8^2 + x^2 = (x+2)^2</math><br/><math>64 + x^2 = x^2 + 4x + 4</math><br/><math>64 = 4x + 4</math><br/><math>x = 15</math></p> <p>② <math>\tan \theta = \frac{15}{8}</math><br/><math>\theta = \tan^{-1}(\frac{15}{8})</math><br/><math>\theta = 61.9^\circ</math></p> <p>③ <math>? = 90 - 61.9</math><br/><math>? = 28.1^\circ</math></p> |



# IV. Complete each word problem. Round to tenth place. Must show work!

Key cont 6d

- 12.) The tailgate of a moving truck is 2 feet above the ground. The incline of the ramp used for loading the truck is 15°. What is the length of ramp in inches?



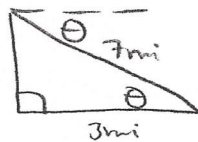
$$\sin 15 = \frac{2}{X}$$

$$X = \frac{2}{\sin 15}$$

$$X = 7.77$$

$$\rightarrow X = 92.4 \text{ in}$$

- 13.) An airplane is starting to descend to a local airport's 3 mile runway. The airplane is 7 miles from the end of the runway. What is the plane's angle of depression to the end of the runway?

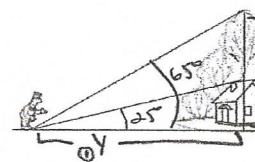


$$\cos \theta = \frac{3}{7}$$

$$\theta = \cos^{-1}(\frac{3}{7})$$

$$\theta = 64.6^\circ$$

- 14.) From his viewpoint, Larry estimates that there is a 25° angle to the top of his house. At the same time, he estimates that there is a 65° angle to the top of a nearby 83-foot tree. What is the height of Larry's house?



$$\textcircled{1} \tan 65 = \frac{83}{y}$$

$$y = \frac{83}{\tan 65}$$

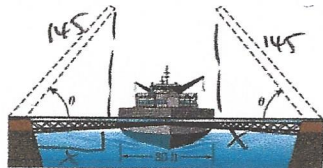
$$y = 38.7$$

$$\textcircled{2} \tan 25 = \frac{x}{38.7}$$

$$x = 38.7 \tan 25$$

$$x = 18.4$$

- 15.) Each leaf of a double-leaf drawbridge is 145 feet long. An 80-foot wide ship needs to pass through the open bridge. What is the minimum value of angle  $\theta$  which each leaf of the bridge should open so that the ship will fit?



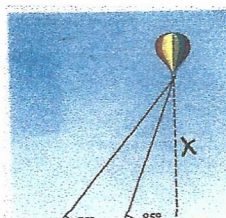
$$\textcircled{1} 2x + 80 = 290$$

$$x = 105$$

$$\textcircled{2} \cos \theta = \frac{105}{145}$$

$$\theta = 43.6^\circ$$

- 16.) A hot air balloon is attached to two ropes on the ground. The ropes are 125 ft apart with different angles of elevation to the balloon. How high is the balloon?



$$\textcircled{1} \tan 85 = \frac{x}{y}$$

$$x = y \tan 85$$

$$\textcircled{2} \tan 75 = \frac{x}{y + 125}$$

$$x = (y + 125) \tan 75$$

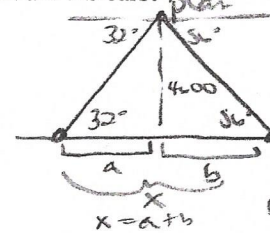
$$\textcircled{3} y \tan 85 = (y + 125) \tan 75$$

$$3.062673y = y + 125$$

$$\textcircled{4} x = 60.6 \tan 85$$

$$x = 692.7 \text{ ft}$$

- 17.) An airplane is flying at an elevation of 4,600 ft, directly above a straight highway. Two motorists are driving cars on the highway on opposite sides of the plane, and the angle of depression to one car is 32° and the other is 56°. How far apart are the cars?



$$\textcircled{1} \tan 32 = \frac{4600}{a}$$

$$a = 7361.5$$

$$\textcircled{2} \tan 56 = \frac{4600}{b}$$

$$b = 3102.7$$

$$\textcircled{3} x = a + b$$

$$x = 7361.5 + 3102.7$$

$$x = 10464.2 \text{ ft}$$

## Part B – The following problems will be SHORT ANSWER on the test.

## V. Solve each triangle – use appropriate letters. Round to tenth place. Must show work!

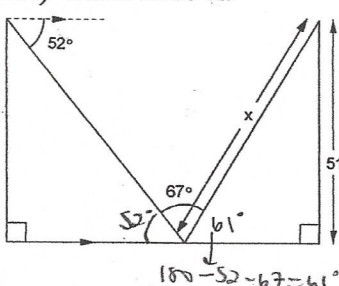
- 18.)
- 
- $$\textcircled{1} A = 90 - 41$$
- $$A = 49^\circ$$
- $$\textcircled{2} \tan 41 = \frac{8}{a}$$
- $$a = \frac{8}{\tan 41}$$
- $$a = 9.2$$

- 19.)
- 
- $$\textcircled{1} 12^2 + 15^2 = c^2$$
- $$c^2 = 369$$
- $$c = 19.2$$
- $$\textcircled{2} \tan A = \frac{12}{15}$$
- $$A = \tan^{-1}(\frac{12}{15})$$
- $$A = 38.7^\circ$$

## VI. Critical Thinking Problems – Find the indicated side or angle for each given diagram.

Note: These diagrams are NOT DRAWN to SCALE!! Round to tenth place. Must show work!

- 20.) Find side x.

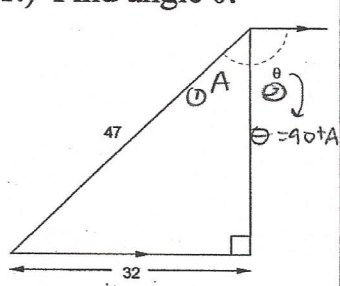


$$\sin 61 = \frac{x}{51}$$

$$x = \frac{51 \sin 61}{1}$$

$$x = 58.3$$

- 21.) Find angle  $\theta$ .



$$\textcircled{1} \cos A = \frac{32}{47}$$

$$A = \cos^{-1}(\frac{32}{47})$$

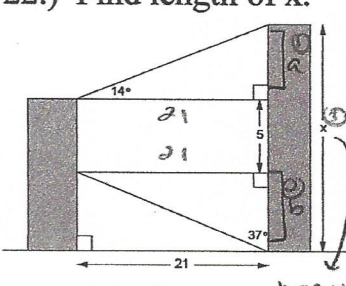
$$A = 42.9^\circ$$

$$\textcircled{2} \theta = 90 + A$$

$$\theta = 90 + 42.9$$

$$\theta = 132.9^\circ$$

- 22.) Find length of x.

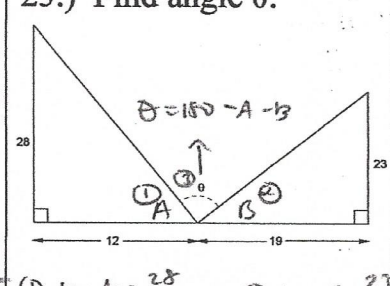


$$\textcircled{1} \tan 37 = \frac{x}{21}$$

$$x = 21 \tan 37$$

$$x = 15.2$$

- 23.) Find angle  $\theta$ .



$$\textcircled{1} \tan A = \frac{28}{12}$$

$$A = \tan^{-1}(\frac{28}{12})$$

$$A = 66.8^\circ$$

$$\textcircled{2} \theta = 180 - A - 90$$

$$\theta = 180 - 66.8 - 90$$

$$\theta = 23.2^\circ$$

$$\textcircled{3} x = a + b$$

$$x = 5.2 + 15.2$$

$$x = 20.4$$