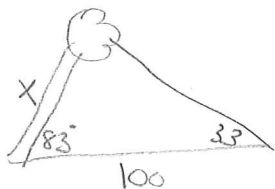College Algebra

Name __Key__

4.4 Review applications

Date: _____ Period: _____

1.) John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33°. This particular tree grows at an angle of 83° with respect to the ground rather than vertically (90°). How long is the tree?
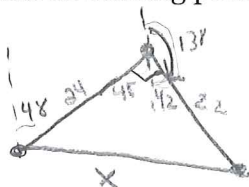

$$\frac{100}{\sin 64} = \frac{X}{\sin 33}$$

$$X = 60.5966$$

$$\boxed{60.60 \text{ feet}}$$

2.) A sailboat travels 24 miles on a bearing of 48°, then it turns and travels 22 miles on a bearing of 138°. How far is the sailboat from its starting position?
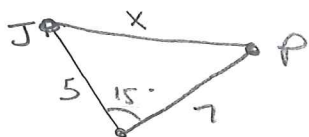

$$x^2 = 22^2 + 24^2$$

$$x^2 = 1060$$

$$\boxed{X = 32.56 \text{ miles}}$$

3.) For the figure skating routine, Jackie and Peter start next to each other. To begin the routine they skate apart, each in a straight line, with an angle of 15 between them. How far apart are they after Jackie skates for 5 meters and Peter skates for 7 meters?

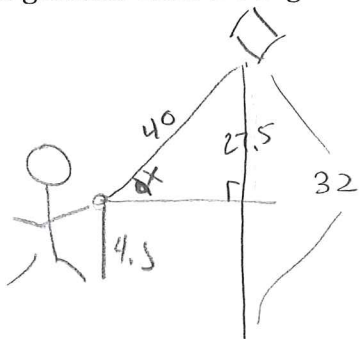$$x^2 = 7^2 + 5^2 - 2(7)(5)\cos 15$$

$$x^2 = 6.38\ldots$$

$$X = \boxed{2.53 \, m}$$

4.) Billy, whose hands are 4.5 feet above the ground, is flying a kite that has a string length of 40 feet and is 32 feet above the ground. Find the angle of elevation of the kite from Billy's ~~eye's.~~ hands.
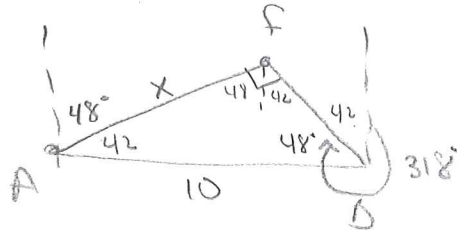

$$\sin x = \frac{27.5}{40}$$

$$\boxed{X = 43.43°}$$

5.) Fire towers A and B are located 10 miles apart. Rangers at fire tower A spot a fire at 42°, and rangers at fire tower B spot the same fire at 64°. How far from tower A is the fire?
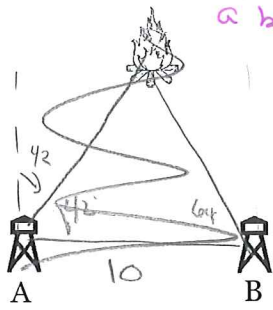
a bearing of 48°
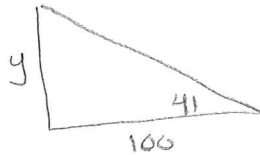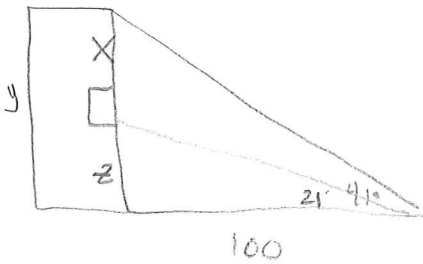
a bearing of 318°

$$\cos 42 = \frac{x}{10}$$

$$\boxed{X = 7.43 \text{ miles}}$$

6.) A building is of unknown height. At a distance of 100 feet away from the building, an observer notices that the angle of elevation to the roof of the building is 41° and that the angle of elevation to a poster on the side of the building is 21°. How far is the poster from the roof of the building?

$$X + z = y$$
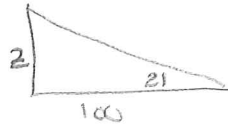
$$\text{Tan } 41 = \frac{y}{100}$$

$$y = 86.93$$

$$\text{Tan } 21 = \frac{z}{100}$$

$$z = 38.39$$

$$\begin{array}{r} 86.93 \\ -38.39 \\ \hline \boxed{48.54 \text{ feet}} \end{array}$$
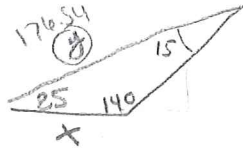
7.) Mark is 160 feet in front of the most beautiful woman in the world. He trips on a rock and falls to the ground. He looks up and measures the angle of elevation to this mysterious woman to be 25°. Mark crawls closer, the angle of elevations is now 40°. How many feet did Mark crawl?
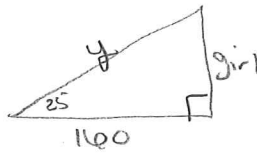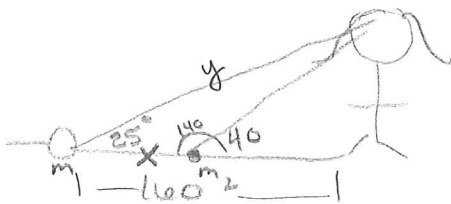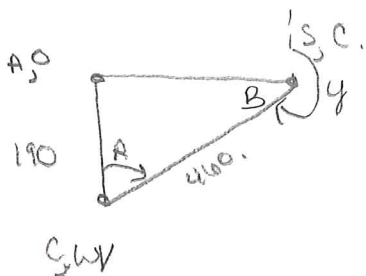

$$\cos 25 = \frac{160}{y}$$

$$y = \frac{160}{\cos 25}$$

$$y = 176.54$$

$$\frac{176.54}{\sin 140} = \frac{x}{\sin 15}$$

$$\boxed{X = 71.08 \text{ feet}}$$

8.) Akron, Ohio is 190 miles due north of Charleston, West Virginia. Stanford, Connecticut is due east of Akron and is 460 miles from Charleston. What is the bearing from Charleston to Stanford? From Stanford to Charleston?

$$\cos A = \frac{190}{460}$$

$$\boxed{A = 65.60°}$$

$$270 - B = \text{bearing}$$

$$270 - 24.4$$

$$\boxed{245.60°}$$