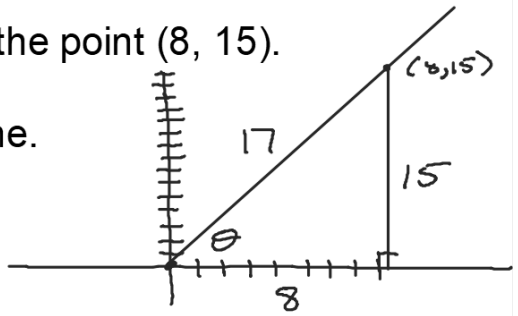
Consider the line that contains the origin and the point (8, 15).

Sketch this line and fine the equation of the line.

$y = mx + b$ $\quad m = \frac{15}{8}$

$y = \frac{15}{8}x$ $\quad b = 0$



Lable the angle formed by the line and the positive x-axis θ.
Without using a calculator, express the following in ratio form.

$\tan\theta = \frac{15}{8}$ $\quad \cos\theta = \frac{8}{17}$ $\quad \sin\theta = \frac{15}{17}$

$c^2 = 8^2 + 15^2$

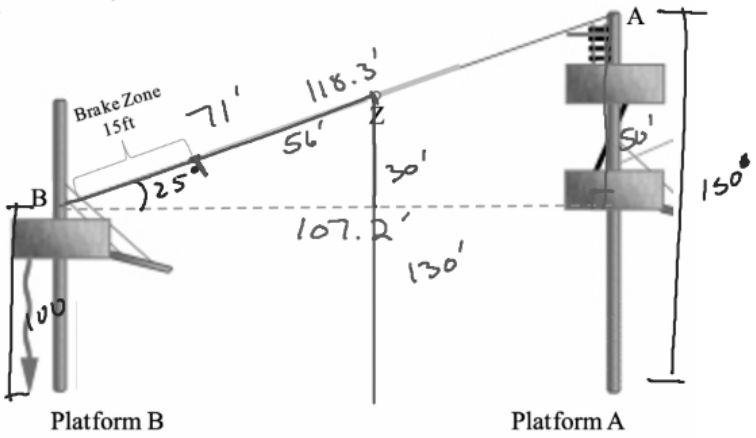
$= 64 + 225$

$= 289$

$c = 17$

George is drawing up plans for a new zip line course for his company The Zipper. The anchor point for the zip line on the platform A is 150 feet above the ground; while anchor point for platform B is 100 feet above ground. The angle of elevation from the line of sight at anchor point B is 25^0. (image is not to scale)

95 ft/sec



Determine the vertical drop from anchor point A to anchor point B

$150 - 100$

50 ft

Determine how much wire will be needed to connect anchor point A to anchor point B. $\sin 25^\circ = \frac{50}{x}$

$x = \frac{50}{\sin 25} = 118.3'$

Determine how far apart the platforms are. $\tan 25 = \frac{50}{x}$

$x = \frac{50}{\tan 25} = 107.2$

If a person using the zip line is traveling 95 fps, and is currently at location Z with a height of 130 feet above the ground, how long will it take them to reach the braking zone 15 feet along the line away from platform B?

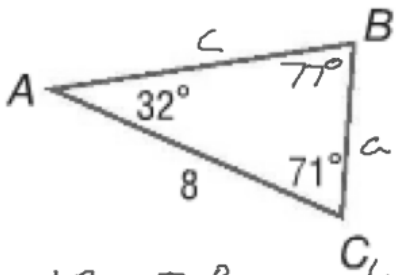
$\sin 25^\circ = \frac{30}{x}$

$x = \frac{30}{\sin 25} = 71.$

$71 - 15 = 56'$

$\frac{56 \text{ ft}}{95 \text{ ft/sec}} = .58 \text{ sec}$

Solve the Triangles



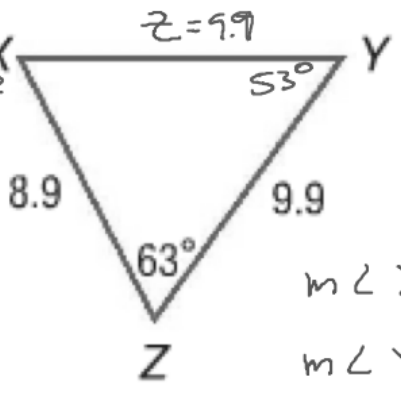
$m\angle B = 77^\circ \quad a = 4.35 \quad c = 7.76$

$$\frac{a}{\sin 32} = \frac{8}{\sin 77} \qquad a = \frac{8\sin 32}{\sin 77}$$

$$\frac{c}{\sin 71} = \frac{8}{\sin 77} \qquad C = \frac{8\sin 71}{\sin 77}$$

$$\frac{9.9}{\sin 63} = \frac{8.9}{\sin Y}$$

$$\sin Y = \frac{8.9\sin 63}{9.9}$$



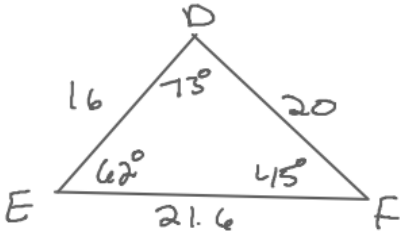
$m\angle X = 64^\circ$

$m\angle Y = 53^\circ$

$z = 9.86$

$z^2 = 8.9^2 + 9.9^2 - 2(8.9)(9.9)\cos 63^\circ$

Solve $\triangle DEF$ if $DE = 16$, $EF = 21.6$, $FD = 20$.



$$\frac{21.6}{\sin 73} = \frac{20}{\sin E}$$

$$\sin E = \frac{20\sin 73}{21.6}$$

$$\sin^{-1}\left(\frac{20\sin 73}{21.6}\right) = 62^\circ$$

$$d^2 = e^2 + f^2 - 2ef\cos D$$

$$21.6^2 = 20^2 + 16^2 - 2(20)(16)\cos D$$

$$466.56 = 400 + 256 - 640\cos D$$

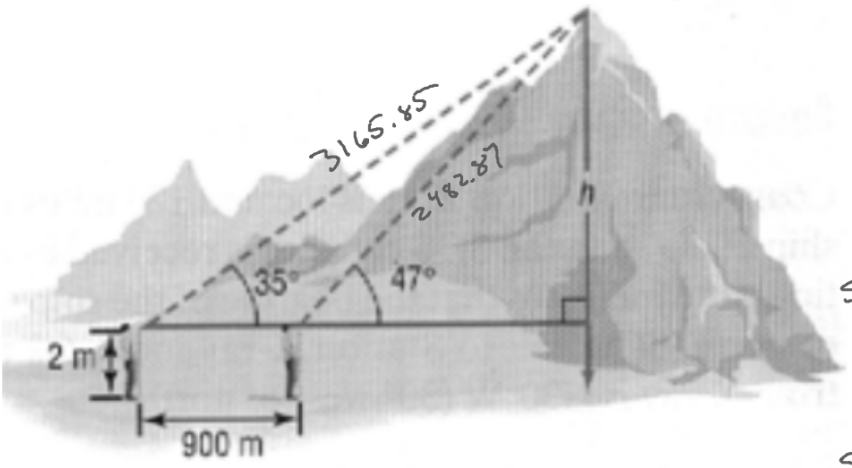
$$466.56 = 656 - 640\cos D$$

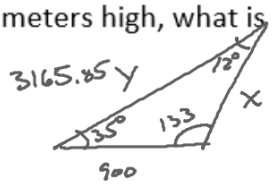
$$-189.44 = -640\cos D$$

$$\cos D = \frac{189.44}{640}$$

$$m\angle D = \cos^{-1}\left(\frac{189.44}{640}\right) = 73^\circ$$

To measure the height of a mountain, a surveyor takes two sighting of the peak at a distance 900 meters apart on a direct line to the mountain. The first observer results in an angle of elevation of 47 , where as the second results in an angle of elevation of 35 . The transit sits 2 meters high, what is the height *h* of the mountain?





$\frac{900}{\sin 12} = \frac{Y}{\sin 133}$ $\quad \frac{900}{\sin 12} = \frac{X}{\sin 35}$

$\sin 47° = \frac{h}{2482.87}$

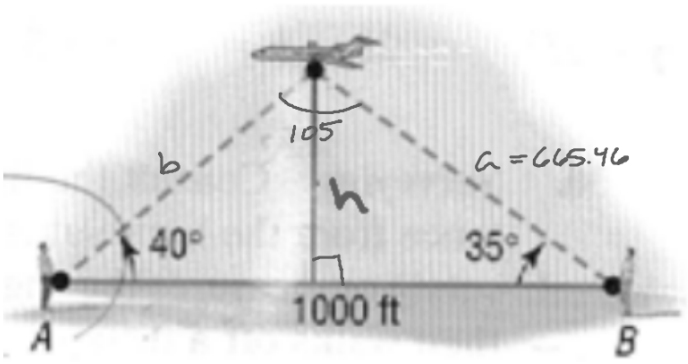
$h = 1815.86 + 2$

$\sin 35 = \frac{h}{3165.85}$

1817.86

$h = 1815.86 + 2$

An aircraft is spotted by two observers who are 1000 feet apart. As the plane passes over the line joining them, each observer takes a sighting of the angle of elevation to the plane, as indicated in the figure. How high is the airplane?



$$\frac{1000}{\sin 105} = \frac{a}{\sin 40}$$

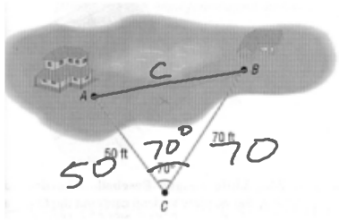
$$a = 665.46$$

$$\sin 35^\circ = \frac{h}{665.46}$$

$$h = 665.46 \sin 35$$

$$= 381.67 \text{ ft}$$

To find the distance from the house A to the house B, a surveyor measures the angle ACB, which is found to be 70 , and then walks off the distance to each house, 50 feet and 70 feet, respectively. How far apart are the houses?

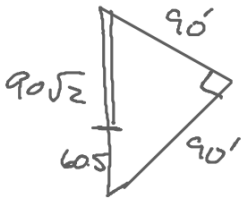


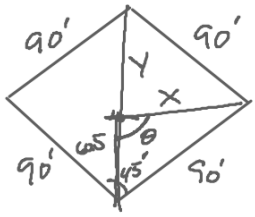
$$C^2 = 50^2 + 70^2 - 2(50)(70)\cos 70^\circ$$

$$C = 70.75$$

A Major League Baseball diamond is actually a square 90 feet on a side. The pitching rubber is located 60.5 feet from home plate on a line joining home plate and second base.

a) How far is it from the pitching rubber to first base?
b) How far is it from the pitching rubber to second base?
c) If a pitcher faces home plate, through what angle does he need to turn to face first base?





a) $x^2 = 60.5^2 + 90^2 - 2(60.5)(90)\cos 45$

$x = 63.72$ ft

b) $90\sqrt{2} - 60.5$

66.78