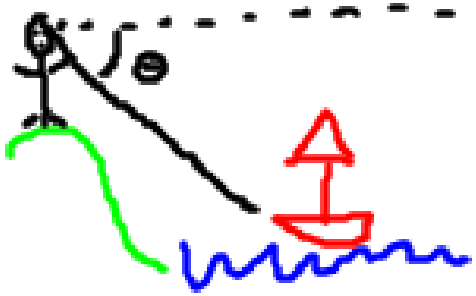
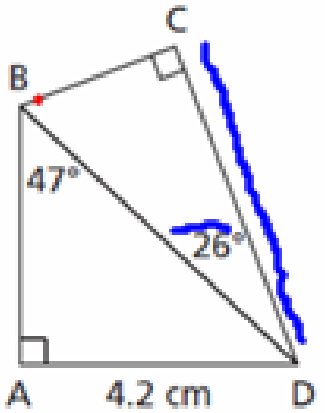
2.7 Solving Problems Involving More than One Right Triangle

angle of depression - is the angle between horizontal and the line of sight from an observer



*KEEP YOUR DECIMALS!!! *

Calculate the length of CD to the nearest tenth of a centimetre.



opp

① BD - hyp

$\sin\theta = \frac{opp}{hyp}$

$\sin 47 = \frac{4.2}{BD}$

$BD = \frac{4.2}{\sin 47}$

$BD = 5.7428 \text{ cm}$

② CD - adj

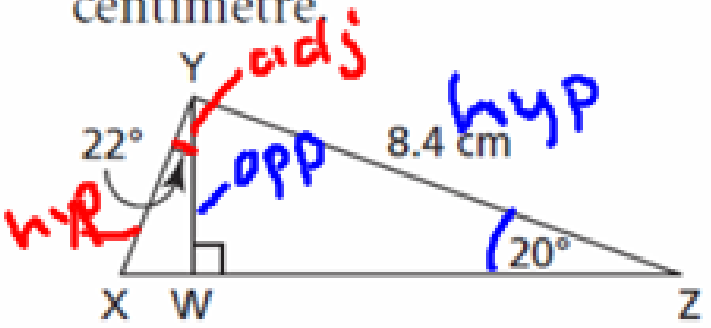
$\cos\theta = \frac{adj}{hyp}$

$\cos 26 = \frac{CD}{5.7428}$

$CD = (5.7428)\cos 26$

$CD = 5.2 \text{ cm}$

1. Calculate the length of XY to the nearest tenth of a centimetre.



① find YW

$\sin\theta = \frac{opp}{hyp}$

$\sin 20 = \frac{YW}{8.4}$

$YW = (8.4)(\sin 20)$

$YW = 2.873$ cm

② Find XY

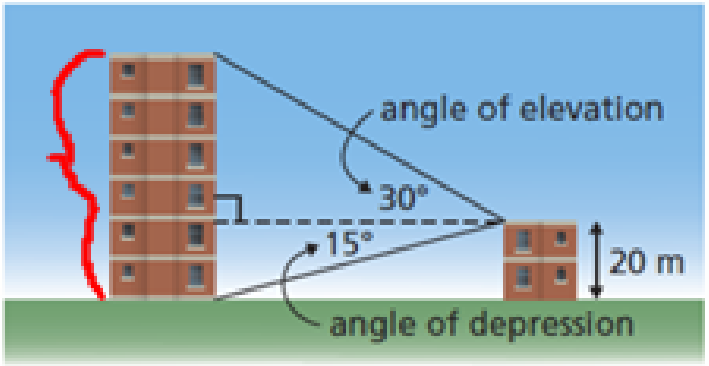
$\cos\theta = \frac{adj}{hyp}$

$\cos 22 = \frac{2.873}{XY}$

$XY = \frac{2.873}{\cos 22}$

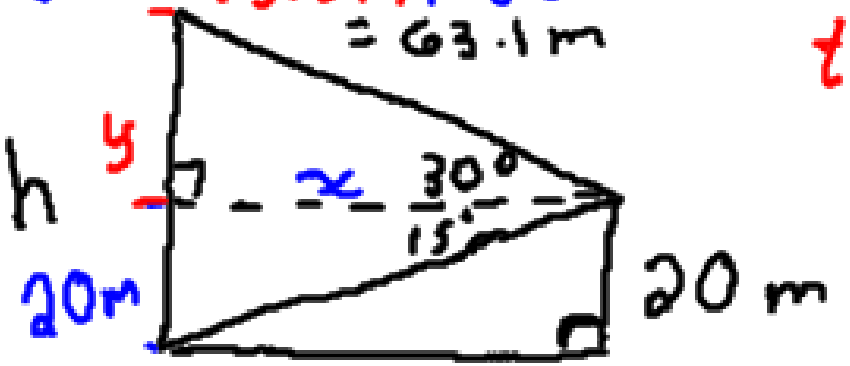
$XY = 3.1$ cm

From the top of a 20-m high building, a surveyor measured the angle of elevation of the top of another building and the **angle of depression** of the base of that building. The surveyor sketched this plan of her measurements. Determine the height of the taller building to the nearest tenth of a metre.



$h = y + 20 = 43.094 + 20$

$= 63.1\text{ m}$



$\tan\theta = \frac{O}{A}$

$\tan 30 = \frac{y}{74.6410}$

$y = (74.6410)\tan 30$

$y = 43.094\text{ m}$

$\tan\theta = \frac{O}{A}$

$\tan 15 = \frac{20}{x}$

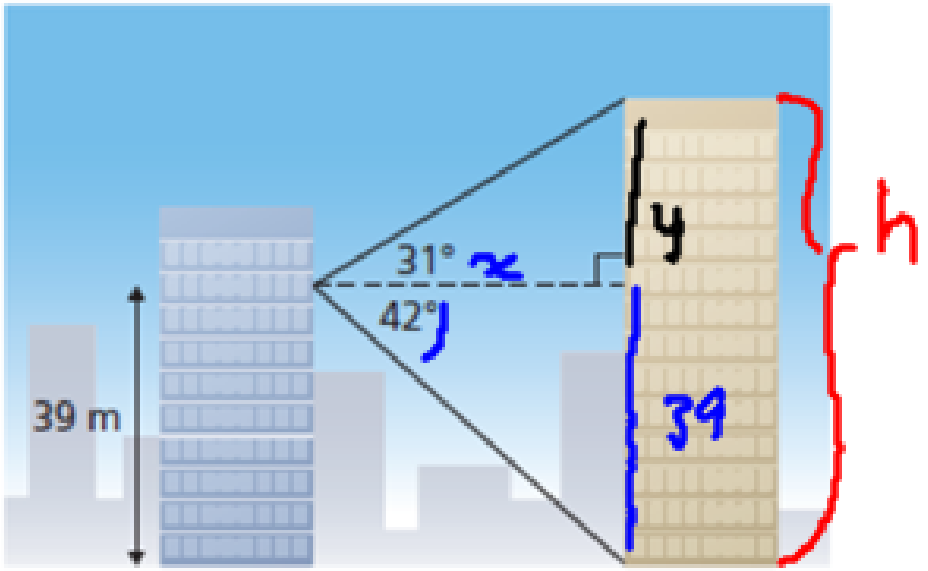
$x = \frac{20}{\tan 15}$

$x = 74.6410\text{ m}$

$h = y + 20$

$h = 63.1\text{ m}$

2. A surveyor stands at a window on the 9th floor of an office tower. He uses a clinometer to measure the angles of elevation and depression of the top and the base of a taller building. The surveyor sketches this plan of his measurements. Determine the height of the taller building to the nearest tenth of a metre.



$h = y + 39.$

$\tan\theta = \frac{O}{A}$

$\tan 42 = \frac{39}{x}$

$x = \frac{39}{\tan 42}$

$x = 43.3138\ m$

$\tan 31 = \frac{y}{43.3138}$

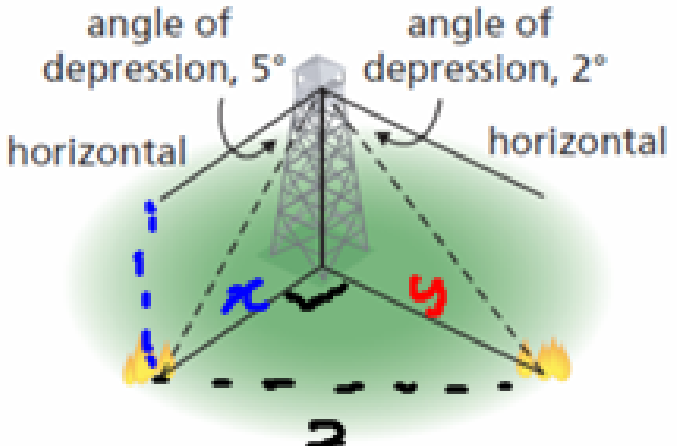
$y = (43.3138)(\tan 31)$

$y = 26.0256.\ m$

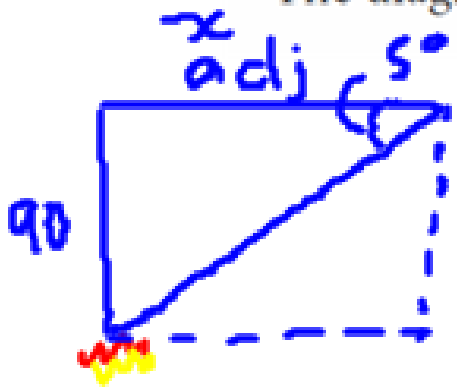
$h = 26.0256 + 39$

$h = 65.0\ m$

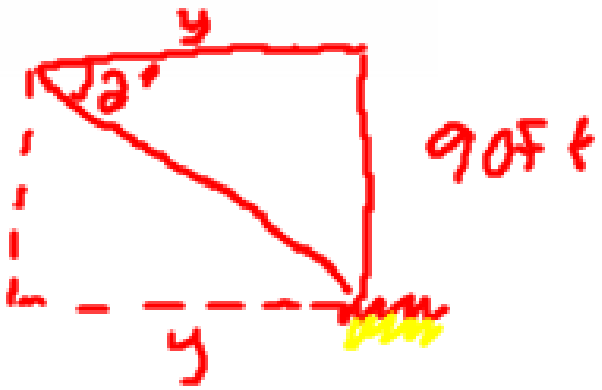
From the top of a 90-ft. observation tower, a fire ranger observes one fire due west of the tower at an angle of depression of 5°, and another fire due south of the tower at an angle of depression of 2°. How far apart are the fires to the nearest foot? The diagram is *not* drawn to scale.



Pythagorean.



$x = 1028.7047$ ft



$\tan\theta = \frac{o}{a}$

$\tan 5 = \frac{90}{x}$

$x = \frac{90}{\tan 5}$

$\tan 2 = \frac{90}{y}$

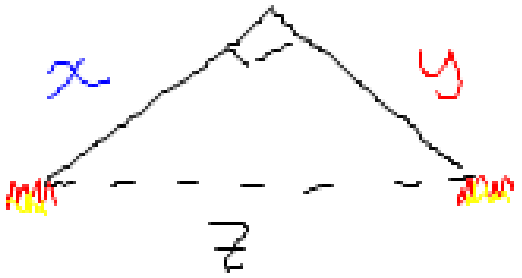
$y = \frac{90}{\tan 2}$

$y = 2577.2627$ ft

$x = 1088.7047$ ft

$y = 2577.2627$ ft

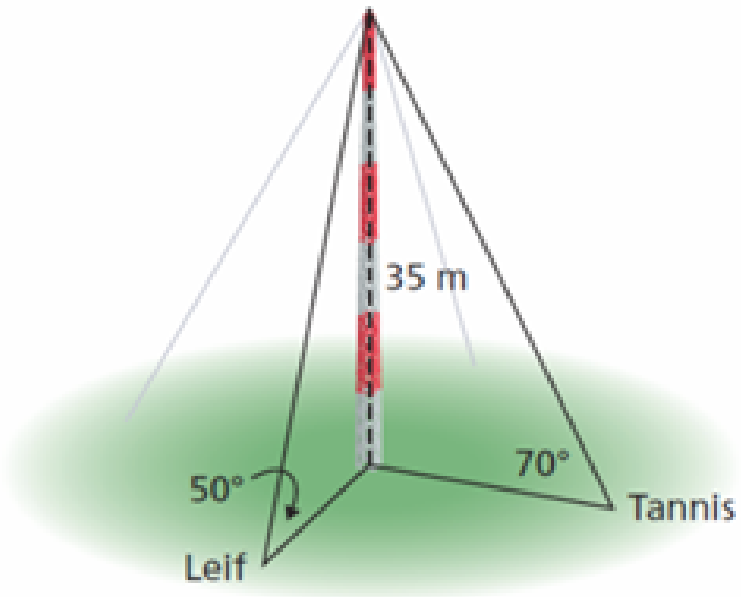
$$z^2 = x^2 + y^2$$



$$z^2 = (1088.7047)^2 + (2577.2627)^2$$

$$z = 2775 \text{ ft}$$

3. A communications tower is 35 m tall. From a point due north of the tower, Tannis measures the angle of elevation of the top of the tower as 70°. Her brother Leif, who is due east of the tower, measures the angle of elevation of the top of the tower as 50°. How far apart are the students to the nearest metre? The diagram is *not* drawn to scale.



32 m

Do p. 118 - # 3-6, 8, 9, 11