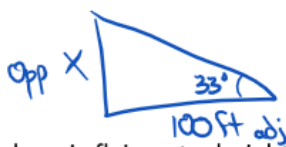


Angle of Elevation and Angle of Depression

Name _____ Date _____ Block _____

- 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 of elevation from the ground to the top of the tree is 33° . How tall is the tree?

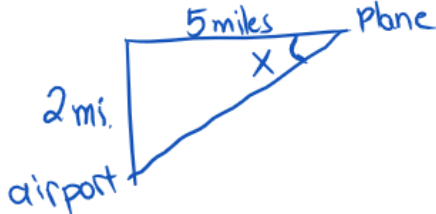


$$\tan(33) = \frac{X}{100}$$

$$X = 100 \cdot \tan(33)$$

$$X = 64.941 \text{ ft}$$

- An airplane is flying at a height of 2 miles above the ground. The distance along the ground from the airplane to the airport is 5 miles. What is the angle of depression from the airplane to the airport?

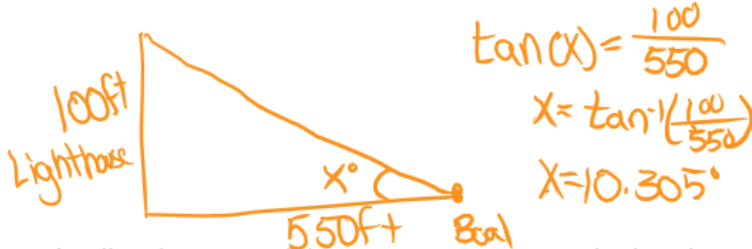


$$\tan(x) = \frac{2}{5}$$

$$x = \tan^{-1}\left(\frac{2}{5}\right)$$

$$x = 21.801^\circ$$

- The captain of a boat knows that a lighthouse on the coast is 100 ft tall and the boat is 550 ft from the coast. What is the angle of elevation that proves that the boat is 550 ft from the coast?



$$\tan(x) = \frac{100}{550}$$

$$x = \tan^{-1}\left(\frac{100}{550}\right)$$

$$x = 10.305^\circ$$

- A tower is 125 ft tall and uses 200 ft long support wires attached to the ground. What is the angle of elevation that would be necessary to use these support wires?

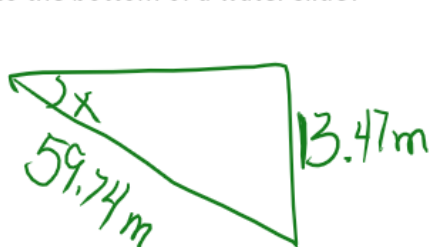


$$\sin(x) = \frac{125}{200}$$

$$x = \sin^{-1}\left(\frac{125}{200}\right)$$

$$x = 38.682^\circ$$

- A water slide extends diagonally 59.74 meters and has a height of 13.47 meters. What is the angle of depression from the top to the bottom of a water slide?

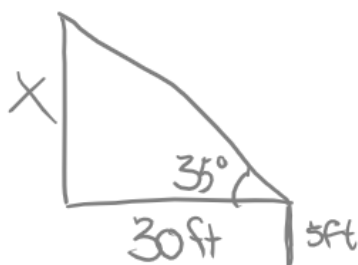


$$\sin(x) = \frac{13.47}{59.74}$$

$$x = \sin^{-1}\left(\frac{13.47}{59.74}\right)$$

$$x = 13.031^\circ$$

- A person standing 30 ft from a flag pole can see the top of the pole at a 35° angle of Elevation. The person's eye level is 5 ft from the ground. Find the height of the flag pole to the nearest foot.



$$\tan(35^\circ) = \frac{X}{30}$$


$$X = 30 \cdot \tan(35^\circ)$$

$$X = 21.006 \text{ ft} + 5 = 26.006 \text{ ft}$$

S O C A T O

H H H A

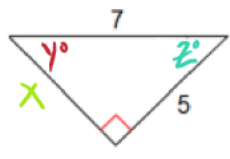
Solve the following triangles. (Find all missing pieces)

1. 

$\tan(61) = \frac{x}{12}$
 $x = 12 \cdot \tan(61)$
 $x = 21.649$ units

$\cos(61) = \frac{12}{z}$
 $z = \frac{12}{\cos(61)}$
 $z = 24.752$ units

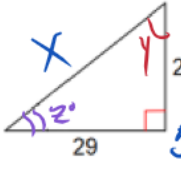
$z + 61 = 90$
 $z = 29^\circ$

2. 

$x^2 + 5^2 = 7^2$
 $x^2 + 25 = 49$
 $x^2 = 24$
 $x = \sqrt{24} = 2\sqrt{6}$ units

$\sin(y) = \frac{5}{7}$
 $y = \sin^{-1}(\frac{5}{7})$
 $y = 45.585^\circ$

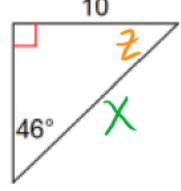
$\cos(z) = \frac{5}{7}$
 $z = \cos^{-1}(\frac{5}{7})$
 $z = 44.415^\circ$

3. 

$23^2 + 29^2 = x^2$
 $529 + 841 = x^2$
 $1370 = x^2$
 $x = \sqrt{1370} = 37.016$ units

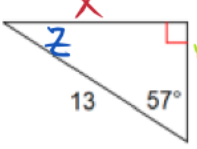
$\tan(y) = \frac{23}{29}$
 $y = \tan^{-1}(\frac{23}{29})$
 $y = 44.582^\circ$

$\tan(z) = \frac{23}{29}$
 $z = \tan^{-1}(\frac{23}{29}) = 41.418^\circ$

4. 

$\sin(46) = \frac{z}{10}$
 $z = \frac{10 \cdot \sin(46)}{1}$
 $z = 7.279$ units


$\tan(46) = \frac{z}{x}$
 $x = \frac{z}{\tan(46)}$
 $x = 9.657$ units

5. 

$\sin(57) = \frac{y}{x}$
 $y = x \cdot \sin(57)$
 $x = 10.903$ units

$\cos(57) = \frac{13}{x}$
 $x = \frac{13}{\cos(57)}$
 $x = 23.800$ units

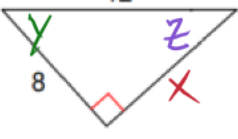
$z + 57 = 90$
 $z = 33^\circ$

6. 

$\cos(x) = \frac{21}{34}$
 $x = \cos^{-1}(\frac{21}{34})$
 $x = 51.855^\circ$

$\sin(y) = \frac{21}{34}$
 $y = \sin^{-1}(\frac{21}{34})$
 $y = 38.145^\circ$

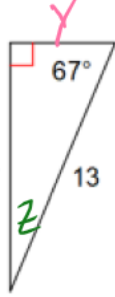
$z + 46 = 90$
 $z = 44^\circ$

7. 

$x^2 + (8)^2 = 12^2$
 $x^2 + 64 = 144$
 $x^2 = 80$
 $x = \sqrt{80} = 8.944$ units

$\cos(y) = \frac{8}{12}$
 $y = \cos^{-1}(\frac{8}{12})$
 $y = 48.190^\circ$

$\sin(z) = \frac{8}{12}$
 $z = \sin^{-1}(\frac{8}{12})$
 $z = 41.810^\circ$

8. 

$(21)^2 + z^2 = (34)^2$
 $441 + z^2 = 1156$
 $\sqrt{z^2} = \sqrt{715}$
 $z = 26.739$ units

$\sin(67) = \frac{x}{13}$
 $x = 13 \cdot \sin(67)$
 $x = 11.967$ units

$\cos(67) = \frac{y}{13}$
 $y = 13 \cdot \cos(67)$
 $y = 5.080$ units

$z + 67 = 90$
 $z = 23^\circ$