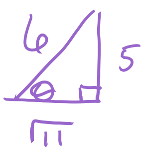
Precalculus Honors
4.2 day 2 and 4.8 Notes

Name Key

Opener

1. Let θ be an acute angle with $\sin\theta = \frac{5}{6}$. Find the remaining 5 trig functions.



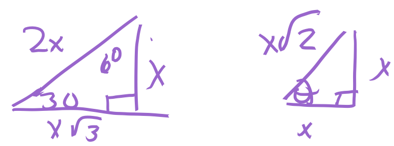
$\cos\theta = \frac{\sqrt{11}}{6}$

$\sec\theta = 6/\sqrt{11}$

$\csc\theta = 6/5$

$\tan\theta = \frac{5}{\sqrt{11}}$

$\cot\theta = \sqrt{11}/5$



2. Evaluate without using a calculator:

a. $\cos\frac{\pi}{3} = \frac{1}{2}$

b. $\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}$

c. $\csc\frac{\pi}{4} = \sqrt{2}$

3. At what measures of θ (in radians) will the following be undefined over the interval [0, 2π)?

a. $\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

b. $\cot\theta = \frac{\cos\theta}{\sin\theta}$

$\theta = 0$

c. $\csc\theta = \frac{1}{\sin\theta}$

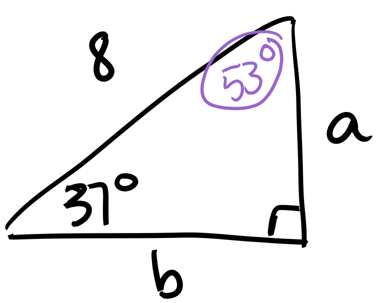
$\theta = 0$

d. $\sec\theta = \frac{1}{\cos\theta}$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

Notes:

Finding missing values in a triangle.



Use what you know about trig ratios to set up equations and solve for “a” and “b”.

$\sin 37° = \frac{a}{8}$

$8\sin 37° = a$

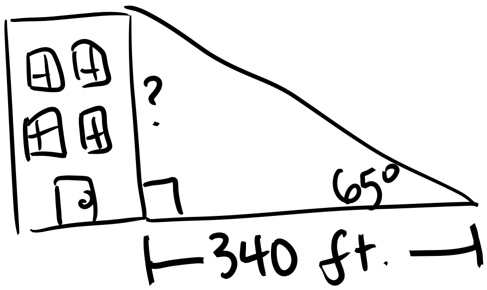
$a \approx 4.815$

$\cos 37° = \frac{b}{8}$

$b = 8\cos 37°$

$b \approx 6.39$

Find the height of the building.

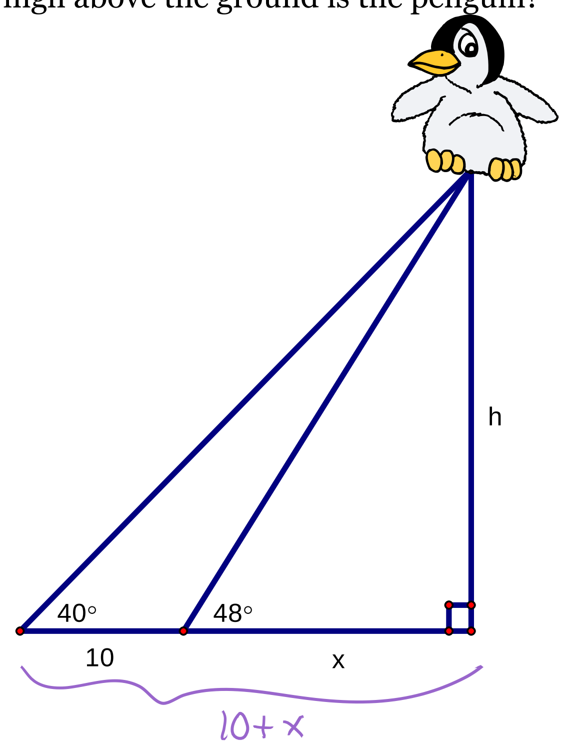


$$\tan 65^\circ = \frac{h}{340}$$

$$h \approx 729.13 \text{ feet}$$

Setting up trig equations based on word problems.

A large, helium-filled penguin is tied to the ground by two large cables. The cables make angles of 48° *and* 40° with the ground. If the cables are attached to the ground 10 feet from each other, how high above the ground is the penguin?



$$\tan 40^\circ = \frac{h}{10+x} \qquad \tan 48^\circ = \frac{h}{x}$$

$$(10+x)\tan 40^\circ = h \qquad x\tan 48^\circ = h$$

$$(10+x)\tan 40^\circ = x\tan 48^\circ$$

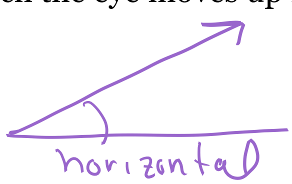
$$10\tan 40^\circ + x\tan 40^\circ = x\tan 48^\circ$$

$$10\tan 40^\circ = x\tan 48^\circ - x\tan 40^\circ$$

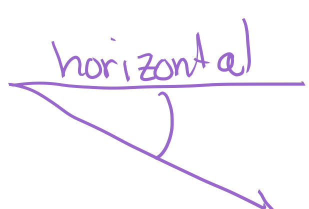
$$10\tan 40^\circ = x(\tan 48^\circ - \tan 40^\circ)$$

$$\boxed{x \approx 30.90 \text{ feet}}$$

Angle of elevation:
is the angle through which the eye moves up from a **HORIZONTAL** to look at something above.

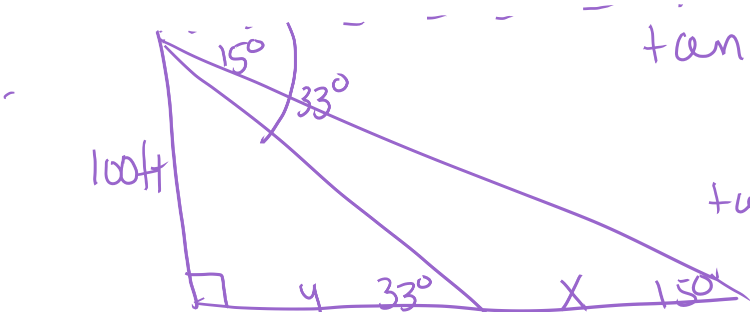


Angle of depression:
is the angle through which the eye moves down from a **HORIZONTAL** to look at something below.



Examples: (angle of elevation/depression and bearing)

a. From the top of a 100-ft building, a man observes a car moving toward him. If the angle of depression of the car changes from 15° to 33° during the period of observation, how far does the car travel?



$\tan 33^\circ = \frac{100}{y}$ $\quad y = \frac{100}{\tan 33^\circ}$

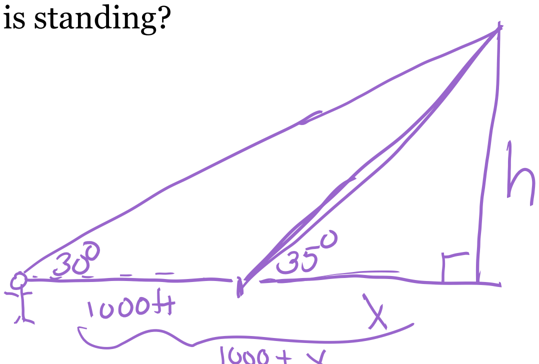
$y = 153.97$

$\tan 15^\circ = \frac{100}{153.97 + x}$ $\quad 153.97 + x = \frac{100}{\tan 15}$

$\boxed{x \approx 219.22 \text{ ft}}$

you try...

b. A recreational hiker names Otis determines the angle of elevation from where he is standing on a level path to the top of a mountain peak is 30°. After moving 1000 feet closer to the peak, he measures the angle of elevationto be 35°. How much higher is the top of the peak than the elevation at which Otis is standing?



$\tan 30^\circ = \frac{h}{1000+x}$ $\quad \tan 35^\circ = \frac{h}{x}$

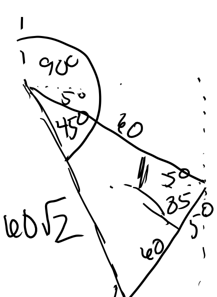
$(1000+x)\tan 30^\circ = h$ $\quad x \tan 35 = h$

$1000 \tan 30^\circ + x \tan 30^\circ = x \tan 35$

$1000 \tan 30^\circ = x \tan 35 - x \tan 30$

$x = 4699.36 \text{ ft}$ $\quad h = 3290.53 \text{ ft}$

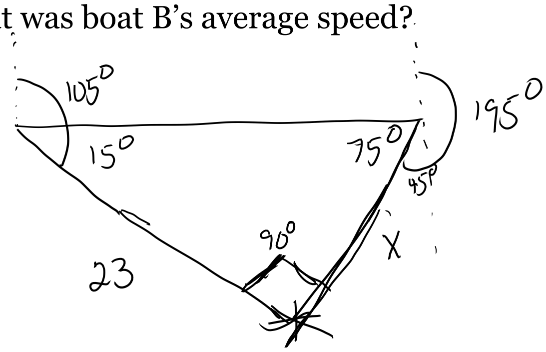
c. A boat travels at 30 mph from its home port on a course of 95° for 2 hours and then changes to a course of 185° for 2 hours. Determine the distance from the boat to its home port and the bearing from the home port to the boat.



$60\sqrt{2} \approx 84.85$

Bearing $95 + 45 = 140^\circ$

d. Boats A and B leave from ports on opposite sides of a large lake. The ports are on an east-west line. Boat A steers a course of 105° and boat B steers a course of 195°. Boat A averages 23 mph and collides with boat B (it was a foggy night). What was boat B's average speed?



$\tan 15^\circ = \frac{x}{23}$

$23 \tan 15^\circ = x$

$x = 6.16 \text{ mph}$