

1. Write $\cos(28)$ in terms of its cofunction.

Sin 62° The Sine of one acute \angle is equal to the cosine of the other acute \angle . The acute \angle 's are complementary.

2. If $\sin(2x + 10) = \cos(x - 30)$, then what is the value of x ?

Complementary

$$2x + 10 + x - 30 = 90$$

$$3x - 20 = 90$$

$$\quad \quad \quad +20 \quad +20$$

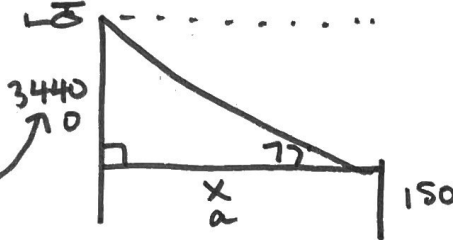
$$3x = 110$$

$$\quad \quad \quad \frac{3x}{3} = \frac{110}{3}$$

$x = 36.67$

3. A helicopter flying 3,590 feet above ground spots the top of a 150-foot tall cell phone tower at an angle of depression of 77° . How far must the helicopter fly to be directly over the tower?

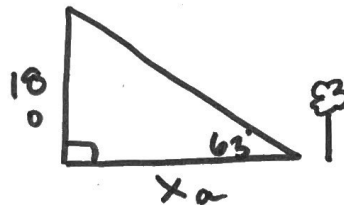
* have to subtract 150 from ht above ground to use the right Δ w/ cell tower



$$\tan 77 = \frac{3440}{x}$$

$$\frac{3440}{\tan 77} = \boxed{794.19 \text{ ft}}$$

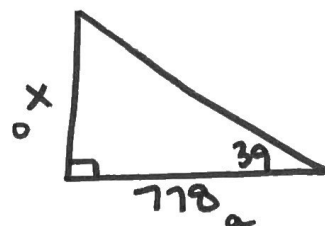
4. The angle of depression from a bird sitting on top of a telephone pole to the base of a tree is 63° . If the telephone pole is 18 feet tall, what is the distance between the pole and the tree?



$$\tan 63 = \frac{18}{x}$$

$$\frac{18}{\tan 63} = \boxed{19.17 \text{ ft}}$$

5. The angle of elevation from a park bench 778 feet from the base of the Gateway Arch in St. Louis, Missouri is 39° . How tall is the Gateway Arch?



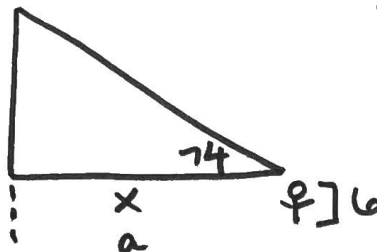
$$\tan 39 = \frac{x}{778}$$

$$778 \tan 39 =$$

630.01 ft

6. Elijah is 6 feet tall and looking up to the top of the Washington Monument. If the monument is 555 feet tall and the angle of elevation from Elijah to the top is 74° , how far is he standing from the base of the monument?

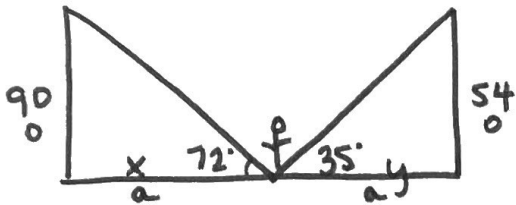
* have to subtract 6 ft from ht of monument to use triangle w/ Elijah.



$$\tan 74 = \frac{549}{x}$$

$$\frac{549}{\tan 74} = \boxed{157.42 \text{ ft}}$$

7. Malaya is standing directly between a 90-foot tall courthouse and a 54-foot tall bank. If the angle of elevation from the point where Malaya is standing to the top of the courthouse is 72° , while the angle of elevation to the top of the bank is 35° . What is the distance between the courthouse and the bank?



$$\tan 72 = \frac{90}{x}$$

$$\frac{90}{\tan 72} = \underline{29.24}$$

$$\tan 35 = \frac{54}{y}$$

$$\frac{54}{\tan 35} = \underline{77.12}$$

$$\boxed{106.36 \text{ ft}}$$

*Add the lengths to get total distance!

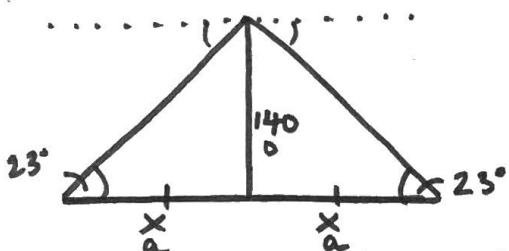
8. The town park does an outdoor movie night every Saturday during the summer on a large screen. Kate is sitting 36 feet from the base of the screen, watching a movie with her family. If the angle of elevation from Kate to the top of the screen is 24° , how tall is the movie screen?



$$\tan 24 = \frac{x}{36}$$

$$36 \tan 24 = \boxed{16.03 \text{ ft}}$$

9. A cell phone tower is anchored by two cables on each side for support. The cables stretch from the top of the tower to the ground, with each being equidistant from the base of the tower. The angle of depression from the top of the tower to the point in which the cable reaches the ground is 23° . If the tower is 140 feet tall, find the ground distance between the cables.



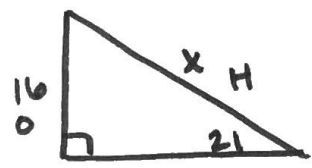
$$\tan 23 = \frac{140}{x}$$

$$\frac{140}{\tan 23} = 329.82$$

$$\boxed{659.64 \text{ ft}}$$

Because the cables are same distance from pole, you can multiply by 2.

10. Max built a skateboarding ramp that is 16 inches high. The angle formed by the ramp and the ground is 21° . What is the length of the ramp?

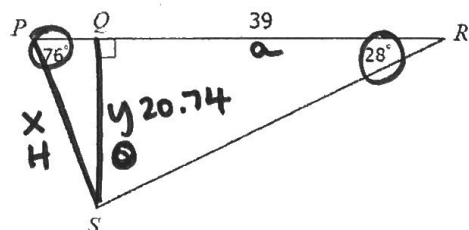


$$\sin 21 = \frac{16}{x}$$

$$\frac{16}{\sin 21} = \boxed{44.65 \text{ in}}$$

11. Find PS

*TO find PS, we have to find QS first!



$$\tan 28 = \frac{y}{39}$$

$$39 \tan 28 = 20.74$$

$$QS = 20.74$$

$$\sin 76 = \frac{20.74}{x}$$

$$\frac{20.74}{\sin 76} = \boxed{21.37}$$