

Trigonometry – Applications

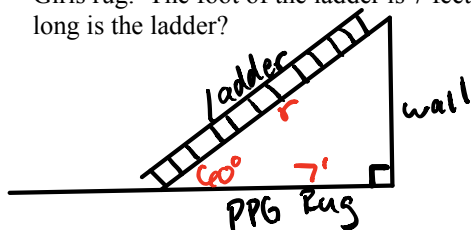
G.SRT.C.8

Hw Section 9.3

Name _____

Solve each problem. If needed, round measures of segments to the nearest hundredth and measures of angles to the nearest degree. You must draw a picture and add information to drawing.

#1) It's not that George is an idiot, it's more that he just doesn't know any better. Did he once mistake a Frisbee for a bologna sandwich? Yes, but in his defense, there was mustard on all the lawn toys that fateful day. Speaking of mustard, one day George's mom asked him to paint his room yellow. So, George grabbed a ladder and leaned it against his bedroom wall. The ladder made an angle of 60° with his Power Puffs Girls rug. The foot of the ladder is 7 feet from the wall. How long is the ladder?



$$\cos 60^\circ = \frac{7}{r}$$

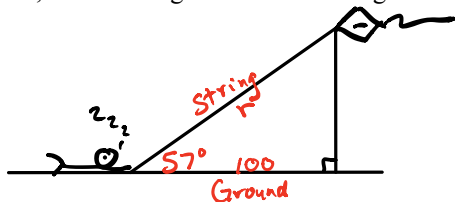
$$r \cdot \cos 60^\circ = 7$$

$$r = \frac{7}{\cos 60^\circ}$$

$$r = 14$$

The ladder is 14 foot long.

#2) After he ran out of mustard, George decided to get some fresh air. He went outside to fly his He-Man kite. Tired from walking all the way outside, George decided to nap while flying The Most Powerful Man in the Universe's kite. The kite string makes an angle of 57° with the ground. If George is laying 100 feet from the point on the ground directly below the kite, find the length of the kite string.



$$\cos(57^\circ) = \frac{100}{r}$$

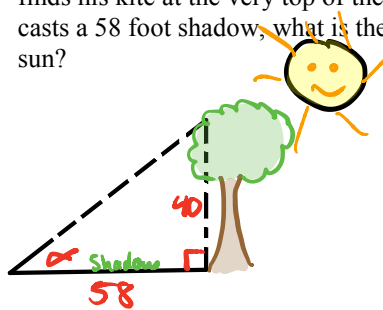
$$r \cdot \cos(57^\circ) = 100$$

$$r = \frac{100}{\cos(57^\circ)}$$

$$r \approx 183.61$$

The Kite string is 183.61 feet long.

#3) With his hands covered in mustard, George accidentally lets his He-Man kite slip out of his fingers. When he awakes, he finds his kite at the very top of the 40 foot tree. If the tree casts a 58 foot shadow, what is the angle of elevation of the sun?



$$\tan \alpha = \frac{40}{58}$$

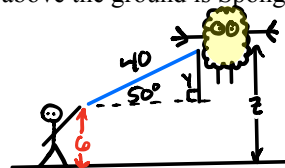
$$\tan^{-1}(\tan \alpha) = \tan^{-1}\left(\frac{40}{58}\right)$$

$$\alpha = \tan^{-1}\left(\frac{40}{58}\right)$$

$$\alpha \approx 35^\circ$$

The sun's angle of elevation is 35° .

#4) Wanting to recover his kite, George has a brilliant idea. He asks his best friend, a SpongeBob shaped helium balloon, to retrieve his kite. While on his tippy toes, George's outstretched hand is 6 feet above the ground. If the 40-foot balloon string makes an angle of 50° with the ground, how high above the ground is SpongeBob?



$$\sin(50^\circ) = \frac{y}{40}$$

$$40 \sin(50^\circ) = y$$

$$30.64 \approx y$$

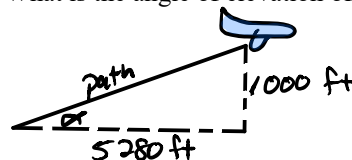
$$y + 6 = z$$

$$30.64 + 6 \approx z$$

$$36.64 \approx z$$

SpongeBob is 36.64 feet high.

#5) At the exact moment a condor pops SpongeBob, an airplane flies overhead. During the airplane's takeoff, airplane rose vertically 1000 feet over a horizontal distance of 1 mile. What is the angle of elevation of the airplane's path?



$$(1 \text{ mile} = 5280 \text{ ft})$$

$$\tan \alpha = \frac{1000}{5280}$$

$$\tan^{-1}(\tan \alpha) = \tan^{-1}\left(\frac{1000}{5280}\right)$$

$$\alpha = 11^\circ$$

The airplane's path has an angle of elevation of 11° .

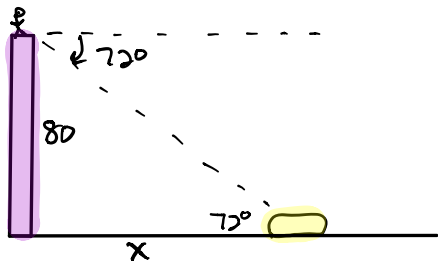
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#6) Trying to grab the airplane out of the sky, George climbs to the top of a 80-foot tower. Once there, he notices a box of Twinkies lying on the ground. From the top of a tower, the angle of depression to the Twinkies is 72° . How far are the Twinkies from the foot of the tower?



$$\tan(72^\circ) = \frac{80}{x}$$

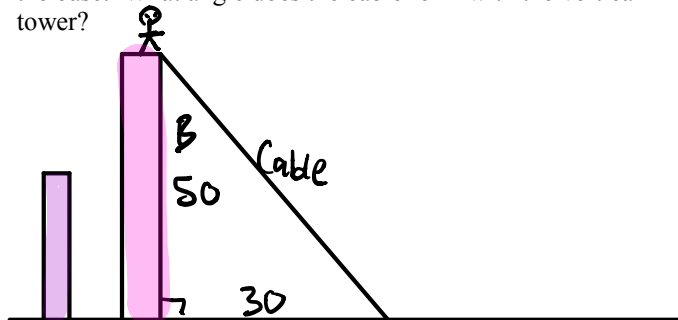
$$x \tan(72^\circ) = 80$$

$$x = \frac{80}{\tan(72^\circ)}$$

$$x \approx 25.99$$

The twinkies are 25.99 feet from the foot of the tower.

#7) While at the top of the 80-foot tower, George jumps to the top of a 50-meter tower. This new tower is braced with a cable secured at the top of the tower and tied 30 meters from the base. What angle does the cable form with the vertical tower?



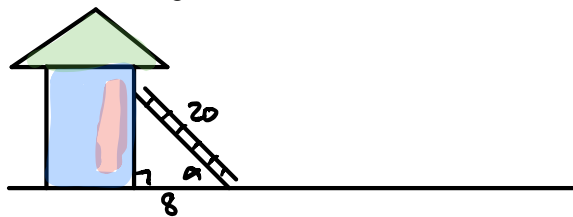
$$\tan B = \frac{30}{50}$$

$$\tan^{-1}(\tan B) = \tan^{-1}\left(\frac{30}{50}\right)$$

$$B = 31^\circ$$

The cable makes a 31° with the tower.

#8) After waking from his dream of climbing towers and swatting down planes, George's mom asks him to paint the outside of the house red. After a quick trip to the refrigerator for paint and to the tool shed to grab a 20-foot ladder, George places the bottom of the ladder 8 feet from the house and gently leans it against the house. What angle does the ladder make with the ground?



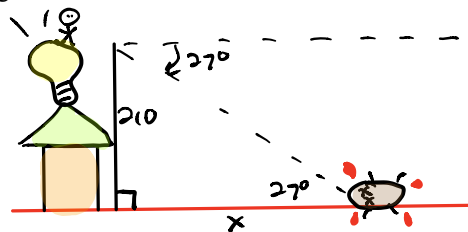
$$\cos \alpha = \frac{8}{20}$$

$$\alpha = \cos^{-1}\left(\frac{8}{20}\right)$$

$$\alpha \approx 66^\circ$$

The ladder makes a 66° with the ground.

#9) Once he runs out of ketchup, George decides to ride his tricycle to find some roadkill so he can scrounge up some more red paint. Trying to find a better viewpoint of the road, George climbs an abandoned lighthouse that is 210 feet high. Once on top, George spots some fresh roadkill. The angle of depression from the top of the lighthouse to the fresh paint is 27° . Find the distance from the roadkill to the foot of the lighthouse.



$$\tan(27^\circ) = \frac{210}{x}$$

$$x \tan(27^\circ) = 210$$

$$x = \frac{210}{\tan(27^\circ)}$$

$$x \approx 412.15$$

The roadkill is 412.15 feet from the foot of the lighthouse.