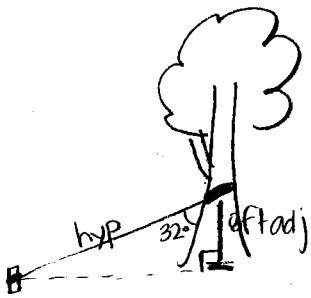
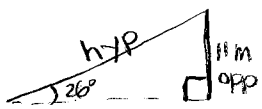
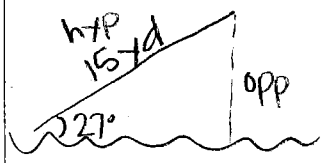
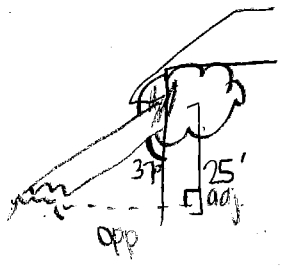
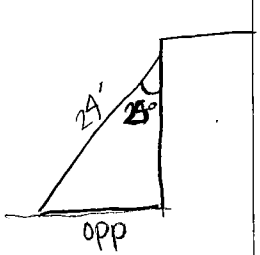
Bryant – Geometry Name: Mikey Hr: __

Right Triangle Applications

SOH CAH TOA

Question	Draw a diagram.	Solve. Show your work.
1. To help support a tree, Jackson ties a rope to the tree trunk 8 feet above the ground. He ties the other end of the rope to a stake. The rope and tree form a 32° angle. Find the length of the rope.		$\cos 32 = \frac{8}{x}$ $x \cdot \cos 32 = 8$ $x = \frac{8}{\cos 32}$ 9.4 feet
2. Alex built a ramp so that he could jump his motorcycle over some cars. The end of the ramp was 11 meters from the ground and met the ground at a 26° angle. How long was the ramp?		$\sin 22 = \frac{11}{x}$ $x = \frac{11}{\sin 26}$ 25.1m
3. Nicky was skiing on Lake Muddy Waters and decided to jump the ski ramp. The ramp was 15 yards long and met the water at a 27° angle. When she was at the top of the ramp, how high above the water was she?		$\sin 27 = \frac{x}{15}$ $x = 15 \cdot \sin 27$ 6.8 yds
4. A tree was blown over in the storm and now leans against Jake's house. Jake found that the tree makes a 37° angle with the house. The tree reaches 25 feet up his house. How far from the house was his tree?		$\tan 37 = \frac{x}{25}$ $x = 25 \tan 37$ x = 18.8 feet
5. Aaron decides to help his mom and wash the windows on his house. When Aaron places a 24-foot ladder against a wall, he finds the ladder forms an angle of 25° with the wall. How far is the bottom of the ladder from the wall?		$\sin 25 = \frac{x}{24}$ $x = 24 \sin 25$ x = 10.1 feet

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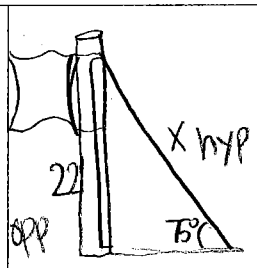
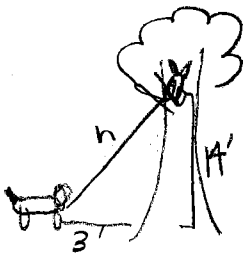
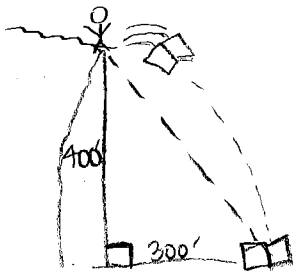
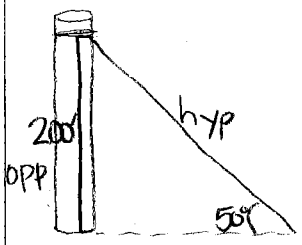
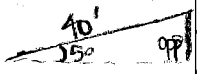
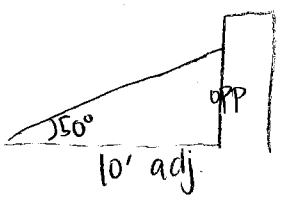
6. Benny is building a flag pole in his back yard. He has to brace it until the cement dries. How long of a wire is needed to brace the 22-foot vertical pole if the brace is to make an angle of 75° with the ground?		$\sin 75 = \frac{22}{x}$ $x = \frac{22}{\sin 75}$ 22.8 feet
7. Sarah saw a dog chase a cat up a tree. The cat is 14 feet up the tree. If the dog is standing 3 feet from the tree, what is the distance from the cat to the dog?		$3^2 + 14^2 = c^2$ $c^2 = 205$ c = 14.3 feet
8. Miguel is standing on a cliff that is 400 feet tall. He decides to throw his Geometry book off the cliff. ☹ The book lands 300 feet from the base of the cliff. How far is the book now from Miguel?		$300^2 + 400^2 = c^2$ $250{,}000 = c^2$ 500 feet
9. Drew noticed that a cable from the top of a 200-ft telephone tower makes a 50° angle with the ground. How long is the cable?		$\sin 50 = \frac{200}{h}$ $h = \frac{200}{\sin 50}$ h = 261.1 feet
10. Lauryn is going boating with her brand new speed boat. The ramp she uses to launch her boat is built at an angle of 5°. The length of the ramp is 40 feet. How far above the water is the dock?		$\sin 5 = \frac{opp}{40}$ $opp = 40 \sin 5$ 3.5 feet
11. Tommy decides to paint his house. The ladder he is using makes an angle of 50° with the ground. If the base of the ladder is 10 feet from the building, how high up the building will Tommy be able to reach?		$\tan 50 = \frac{x}{10}$ $x = 10 \tan 50$ 11.9 feet

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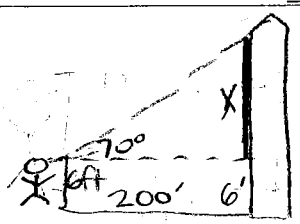
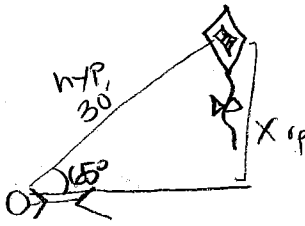
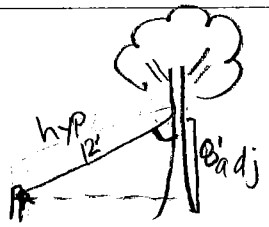
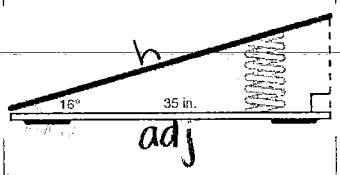
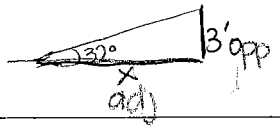
12. JJ is 6 feet tall. When he stands about 200 feet from the Washington Monument, he looks up at the top at a 70° angle. About how tall is the Washington Monument?		$\tan 70 = \frac{x}{200}$ $x = 549.5'$ total height $= 549.5 + 6 =$ **555.5'**
13. Gracie is flying a kite (while lying on the ground) on the end of a 30-foot string. The kite string makes a 65° angle with the ground. How far above the ground is the kite she is flying?		$\sin 65 = \frac{x}{30}$ $x = 30 \sin 65$ **$x = 27.2$ feet**
14. Carson is trying to straighten a tree in his backyard. He uses a 12-foot rope to stake the tree at a point 8 feet above the ground. What is the angle the rope makes with the tree?		$\cos x = \frac{8}{12}$ $x = \cos^{-1}\left(\frac{8}{12}\right)$ **48°**
15. In her dance class Alexis decides to do a flip by jumping off the springboard shown below. To the nearest inch, what is the length of the springboard?		$\cos 16 = \frac{35}{x}$ $x = \frac{35}{\cos 16}$ **36 inches**
16. Austin is going to load his motorcycles into a truck bed that is 3 feet above the ground. The angle that the ramp makes with the ground is 32°. What is the horizontal distance covered by the ramp?		$\tan 32 = \frac{3}{x}$ $x = \frac{3}{\tan 32}$ **4.8 feet**
17. Trey wants to be a contractor and has to build a wheel chair ramp for a doorway that is 1.2 feet above the ground. To meet ADA guidelines, the ramp will need to make an angle of 4.8° with the ground. What is the length of the ramp?		$\sin 4.8 = \frac{1.2}{x}$ $x = \frac{1.2}{\sin 4.8}$ **14.3 feet**

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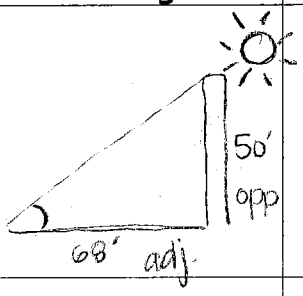
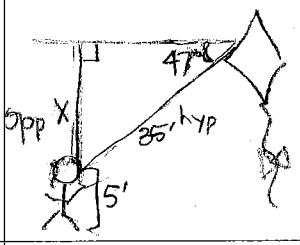
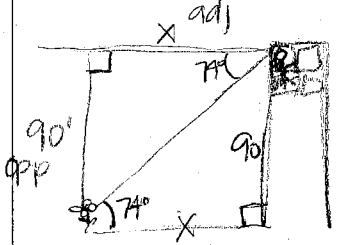
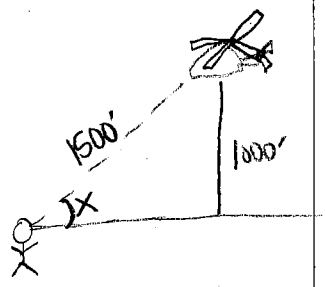
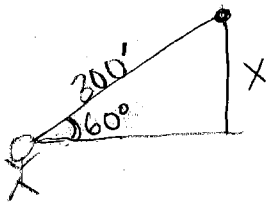
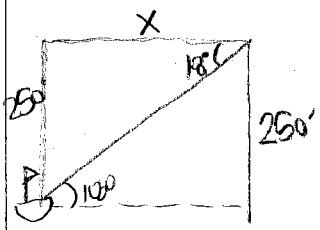
Angle of Elevation and Depression

Question	Draw a diagram.	Solve. Show your work.
18. Jason noticed that a building 50 feet high casts a shadow 68 feet long. Find the measure of the angle of elevation of the sun.		$\tan x = \frac{50}{68}$ $\tan^{-1}\left(\frac{50}{68}\right) = x$ **36°**
19. Abby is flying a kite. The kite has an angle of depression of 47° and is flying on 35 feet of string. If Abby is holding the end of the string 5 feet off the ground, how high above the ground is the kite?		$\sin 47 = \frac{x}{35}$ $x = 35\sin 47$ $x = 25.6'$ total height **30.6'**
20. Lindsey is standing on the top of a tower, and finds the angle of depression to a flower on the ground is 74°. The top of the tower is 90 feet above ground. How far is the flower from the foot of the tower?		$\tan 74 = \frac{90}{x}$ $x = \frac{90}{\tan 74}$ $x =$ **25.8 feet**
21. Denise is looking at a helicopter 1000 feet above the ground. Denise is 1500 feet from the helicopter. What angle of elevation is Denise looking at the helicopter?		$\sin x = \frac{1000}{1500}$ $x = \sin^{-1}\left(\frac{1000}{1500}\right)$ **42°**
22. A helicopter is flying over a building when it is spotted by Micah who is 300 feet away from the building. The angle of elevation from Micah to the helicopter is 60°. What is the altitude of the helicopter?		$\sin 60 = \frac{x}{300}$ $x = 300\sin 60$ **$x = 259.8$ feet**
23. On the observation platform in the crown of the Statue of Liberty, Jesus is approximately 250 feet above ground. He sights a ship in New York Harbor and measures the angle of depression as 18°. Find the distance from the ship to the base of the statue.		$\tan 18 = \frac{250}{x}$ $x = \frac{250}{\tan 18}$ **$x = 769.4$ feet**

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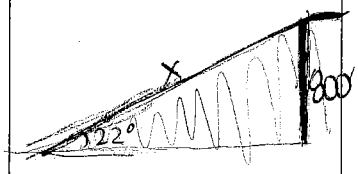
24. Sam is skiing in Colorado and notices the vertical drop of a ski slope is 800 meters. The angle of elevation is $22°$. What is the length of the ski slope?



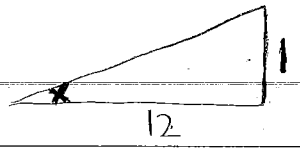
$\sin 22 = \frac{800}{x}$

$x = \frac{800}{\sin 22}$

$x = 2135.6\text{ m}$

25. Tanner wants to be a meteorologist. He discovers that one way to find the height of a layer of clouds above the ground is to shine a bright spotlight directly up into the cloud layer and measure the angle of elevation from a known distance away. Find the height of the cloud layer in the diagram.

26. The Americans with Disabilities Act states that wheelchair ramps can have a slope no greater than $\frac{1}{12}$. Find the maximum angle of elevation of a ramp with this slope.

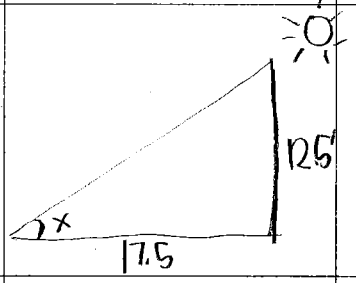


$\tan x = \frac{1}{12}$

$x = \tan^{-1}\left(\frac{1}{12}\right)$

$x = 5°$

27. Max is going outside to shoot some hoops. The height of the outdoor basketball backboard is 12.5 feet, and the backboard casts a shadow 17.5 feet long. Find the angle of elevation of the sun.

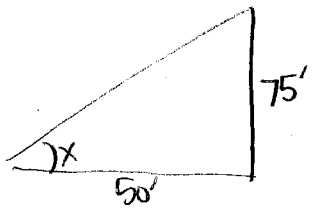


$\tan x = \frac{12.5}{17.5}$

$x = \tan^{-1}\left(\frac{12.5}{17.5}\right)$

$x = 36°$

28. AJ wants to be an amateur radio operator so he builds a 75-foot vertical tower for his antenna. Find the angle of elevation to the top of the tower at a point on level ground 50 feet from the base.

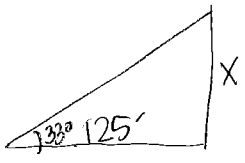


$\tan x = \frac{75}{50}$

$x = \tan^{-1}\left(\frac{75}{50}\right)$

$x = 56°$

29. Sydney is out bird watching and notices the length of a shadow of a tree is 125 feet when the angle of elevation of the sun is $33°$. Find the height of the tree containing the birds.

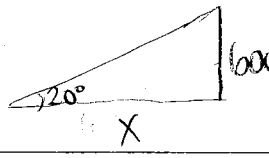


$\tan 33 = \frac{x}{125}$

$x = 125\tan 33$

$x = 81.2\text{ ft}$

30. Cameron notices that the sun is $20°$ above the horizon. Find the length of a shadow cast by a building that is 600-feet high.



$\tan 20 = \frac{600}{x}$

$x = \frac{600}{\tan 20}$

$1,648.5\text{ feet}$