

# Practical Trig Problems

Written by the students of Mr. Pleacher

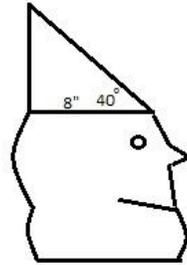
1. The Juniors are decorating the stadium for the football game. They want to run streamers from the top back railing of the bleachers to the bottom railing. They know that the bleachers are 52 feet wide from the front to the back (horizontally). And they know that the streamers will make a 40 degree angle with the railing. How long must each streamer be?
2. In a pre-launch emergency, astronauts exit space shuttle Atlantis on the launch pad and slide down a wire in escape baskets that take the astronauts to safety bunkers 368 feet from the launch pad. If the angle of the slide wire is 38 degrees, how tall is the primary launch tower, and how long is the slide wire?
3. If there is an observation tower which is 30 m high and casts a shadow of 100 m, what is the angle of elevation of the sun at that time?
4. Charlie Brown's kite is caught on a pole. The string makes a 47 degree angle with the ground. If the point at which the string touches the ground is 5 feet away from the pole, how tall is the pole? Charlie Brown's doctor has prescribed that he only climb poles that are 20 feet or less. Taking his doctor's advice, should he climb the pole?
5. John's Problem:

John wants to sneak out of his house on Friday nights and go to parties. His room is on the second floor. He has to buy a ladder to reach his window but doesn't know how long a ladder to buy. He knows his room is 14 feet off the ground, and he knows the ladder should make a 70 degree angle (or less) with the ground to be safe or the ladder may fall and John could break his face. How long must the ladder be?
6. If startled astronomer notices atomic bomb at 8:00 AM falling rapidly downward toward large industrial city of peace loving people 10 miles away,
  - A) How high is the evil nuclear device at 8:00 AM if the astronomer's telescope is tilted at a 37 degree angle?
  - B) Will he have time to hear all of Dial-A-Prayer if it lasts 30 seconds?Hint: Distance of a falling object =  $16t^2$ , where  $t$  is the time in seconds and distance is measured in feet.
7. Wood Plank Problem

Workmen like to work with the smallest possible angles when moving things. For loading and unloading furniture, the movers like to use planks of wood which make a 20 degree angle with the ground. If the back of the moving truck is 3 feet off the ground, how long should the board be in order to form a 20 degree angle with the ground?

8. Kelly is always late to her bus stop on the corner. To save time, she decides to build a slide 320 feet long from her bedroom window to the corner so that she can jump out the window and slide all the way to the bus stop. This way, she won't have to walk the 160 feet from directly underneath her bedroom window to the bus stop. But Kelly's mom is worried that she'll fall off the slide and break her neck. Can you tell Kelly's mom how far it is from her bedroom window to the ground?
9. Launching Estes Solid Fuel Rockets  
The Estes Company sells a device to measure how high your rocket goes up. You point the top of this gadget at the rocket and it tells you the angle from the horizontal to the rocket. If the rocket made an angle of 73 degrees with the horizontal at its highest point, and you are 15 feet from the launch pad, how high did the rocket travel?
10. At what angle should a paper airplane be thrown so as to clear the math teacher's head if the teacher just happens to be 6 feet tall and his last name begins with P? Assume you are throwing the airplane from a height of 4 feet (while sitting in your desk) and that you are 15 feet away from the teacher.
11. Robbie S. Crusoe is confronted by two monstrous tidal waves caused by an evil nuclear device splitting up a certain peace loving nation (in a previous problem). The two waves smother two groves of palm trees -- one 50 feet away to the East and the other 70 feet away to the West -- from his mud and straw hut. Wave 1 is travelling at 70 mph from the East and wave 2 is sloshing along at only 65 mph from the West. He quickly (very quickly) estimates that when the palm trees go, there is a 40 degree angle and a 38 degree angle, respectively, to the two tidal waves. Using the sine, cosine, and tangent tables that washed up from the U.S.S. Pleacher, now resting on the ocean floor, do you think he can figure out which wave is higher before they hit? If he could, what would he learn? Which wave will hit first?
12. You are walking up a hill and you know that it is 1800 m from the bottom of the hill to the top. If the hill makes an angle of 43 degrees with the level ground, how high is the elevation of the hill? (the vertical height)
13. A man on a 10 foot balcony looks down at a person standing 20 feet from the balcony (the horizontal distance). What is his angle of depression?
14. Golf:  
You have hit a bad tee shot and your golf ball is behind a tree. The club you chose has a 65 degree loft and the tree is exactly 25 feet tall. Your shot goes up and clears the tree by three feet. How far away was your ball from the tree?
15. If the bottom of Jefferson Street is 500 feet above sea level and the top is 550 feet above sea level, what is the angle of elevation if the street is a half mile long?

16. Bubba had an "Afro" and wanted the "flat top" look, but his barber suggested the "lopsided cone" look instead. So, his barber cut his hair at a 40 degree angle to his head. If the hair along the scalp (from front to back) is 8 inches long, how tall was the cone?



17. At what angle is your elbow bent when you support your head with your arm (assume the upper part of your arm is 10 inches and the lower part of your arm is 12 inches, and that a right angle is formed from the point where your fingers are touching your head down to your shoulder and then down to your elbow -- see diagram below)?



18. Susie built a tree house in the top of a tree that was 11 feet tall. In order to get up to her tree house, Susie leans a ladder against the tree. The ladder makes an angle of 52 degrees with the level ground. What is the length of the ladder (if the top of the ladder rests at the top of the tree)?
19. On Handley's Cross Country course, there is a hill called Crusher Hill. If it rises 25 feet vertically and the hill is 75 feet long, what is the angle of elevation of the hill?
20. A ball is stuck in the gutter on the roof of the garage. The gutter is 7.5 feet above the ground. A ladder 8 feet long is put at an angle against the garage. What is the angle that the ladder makes with the ground?