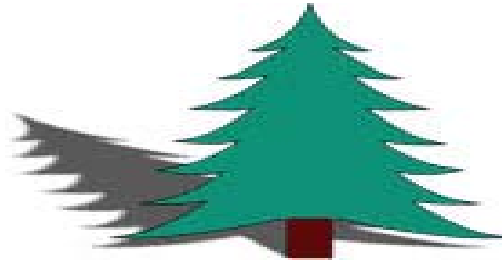


Without a Shadow of a Doubt!



Tameka has a math/science project to complete on indirect measurement that requires a sunny day. She needs to find the height of an oak tree in the neighborhood park using shadows cast by her and the tree. Since Tameka tends to procrastinate, she has left this project to the day before it is due. Unfortunately, this day is not a sunny day. It is overcast with a 60% chance of rain. Tameka panics and calls her friend, Juan, from her science class. Juan tells her, “not to worry” because she can use a mirror instead on a cloudy day. He explains that the mirror works on the principle that the angle of incidence has the same measure as the angle of reflection. Tameka is puzzled and asks Juan to meet her at the park so that he can explain how this will work “without a shadow of a doubt!”.

At the park, Juan places a mirror on the ground 20 feet from the tree and asks Tameka to walk toward the tree in line with the mirror until she sees the top of the tree in the mirror. He measures the distance from the tip of her shoes to the mirror to be 5 feet. Using Tameka’s height of 5 feet 3 inches, she is able to use geometry concepts to find the height of the tree.

“Mirror” the procedure used by Juan and Tameka and find the height of a tall object. Make a sketch of the situation and use geometry concepts to explain your solution.

1. Explain the meaning of the “angle of incidence” and the “angle of reflection” in your drawing/sketch. How can this information help you solve the problem?
2. What is the relationship between the two triangles in your drawing? Justify your answer using geometry terms, postulates, and/or theorems.
3. How did you find the height of the tall object? What math concepts did you use?