

Applying Similar Triangles

Are you ready to get outside and explore our world? Well today is the day! Below you will find two activities that are valid for indirect measurement. **You do not have to do both!** Read each one carefully, think about your environment and your resources, and then decide which one will work best for you.

Activity #1: Indirect Measurement Using Shadows

What Do I Need?

- One object where you can measure its height directly
- One object that you cannot measure its height directly
- Sunny Day
- Clear “Shadow Line”
- Measuring Tape
- Notepad and Pencil

What Will I Do?

- Choose your two objects
- Measure and record the height for Object #1.
- Measure and record the length of the shadow of Object #1 and Object #2
- Draw a diagram of each object and its shadow. Make each of these into a triangle.
- Label the triangles with the recorded information and think carefully about which angles are congruent and why. Mark these on your diagrams.
- Find the height of Object #2 using your knowledge of similar triangles.

What Do I Need to Present?

You get to decide if you'd like to present this in a written format like a lab report or in a video presentation with a tool like PowerPoint. Either form must have the following information.

- Summary of the procedure with specific names of the objects you used. (Pictures would be even better!)
- Clear Table with recorded information

- Neat and Accurate Diagrams
- Thorough explanation of how you know that these triangles formed by the objects are similar. (Hint: This should include at least one of our Theorems to Prove Triangles Similar.) Also, in this explanation, please following the following question, “Could you perform this experiment in two separate parts where you measured the height and shadow of Object 1 in the morning and then the shadow of Object 2 in the afternoon?” Explain why this would or wouldn’t work.
- Calculation (neat and thorough) of the height of Object #2
- Reflection and Conclusion as you think about any types of challenges you encountered and how you overcame them, any types of human error that may need to be considered, and any concepts that you feel you learned (or better understand) after this activity. If you have further questions that came up as you did the activity, this is the place for them as well.

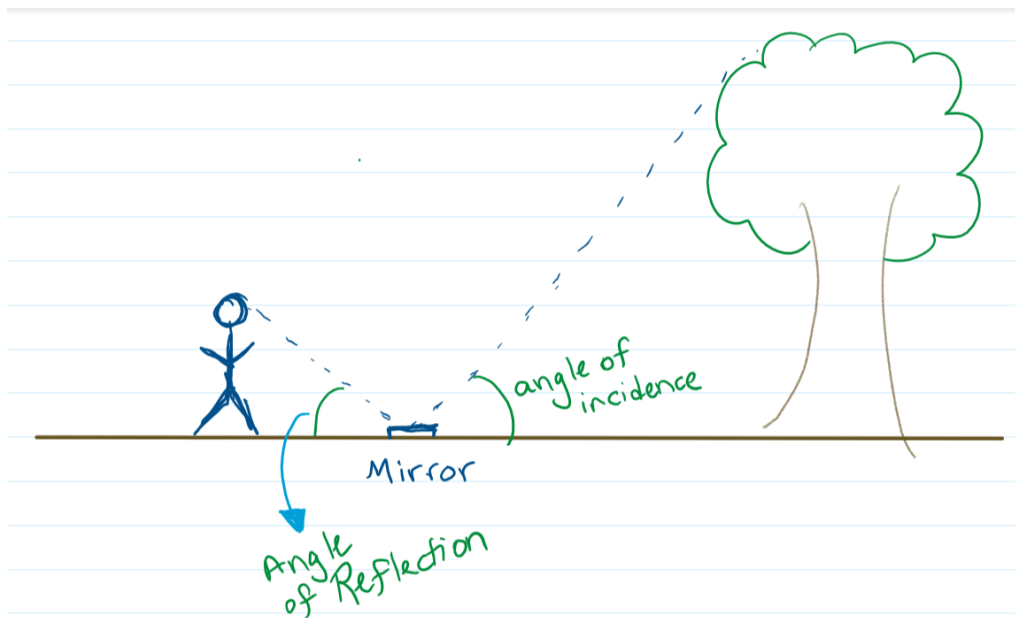
Activity #2: Indirect Measurement Using Mirrors

What Do I Need?

- One object where you can measure its height directly (like you).
- One object that you cannot measure its height directly
- Mirror
- Clear “Line of Sight” between objects
- Measuring Tape
- Notepad and Pencil

What Will I Do?

- Choose your two objects
- Measure and record the height for Object #1 (you).
- Place the mirror between you and the object. Move forward or backwards until you can look at the mirror and see the top of Object #2 (unknown height). See diagram below. Note you may have to move the mirror a couple of times for best results.



- Measure the distance between you and the mirror and then from the mirror to the base of the object.
- Draw a diagram of this situation showing both objects and the location of the mirror. Show the two similar triangles involved in this situation.
- Label the triangles with the information that you recorded and think carefully about which angles are congruent and why. Mark these on your diagrams. (Note: There is a rule in physics that states the Angle of Incidence = Angle of Reflection.)
- Find the height of Object #2 using your knowledge of similar triangles.

What Do I Need to Present?

You get to decide if you'd like to present this in a written format like a lab report or in a video presentation with a tool like PowerPoint. Either form must have the following information.

- Summary of the procedure with specific names of the objects you used. (Pictures would be even better!)
- Clear Table with recorded information
- Neat and Accurate Diagrams
- Thorough explanation of how you know that these triangles formed by the objects are similar. (Hint: This should include at least one of our Theorems to Prove Triangles Similar.) Also, in this explanation, please answer the following question, "Is there only one location for the mirror to be placed in order for this to work or could I move it to new positions?" Explain your reasoning.
- Calculation (neat and thorough) of the height of Object #2

- Reflection and Conclusion as you think about any types of challenges you encountered and how you overcame them, any types of human error that may need to be considered, and any concepts that you feel you learned (or better understand) after this activity. If you have further questions that came up as you did the activity, this is the place for them as well.