

TEACHER – REFLECTION BULLSEYE ACTIVITY

Overview

This is the culminating activity, requiring students to use their knowledge of the law of reflection. An emphasis should be placed on making accurate measurements and predictions of angles, and in following the rules of the challenge.

Students Will Learn...

How to use the law of reflection to design an “obstacle course” for a laser using multiple mirrors to direct the laser beam to a specific target.

- Challenge includes designing the setup **WHILE THE LASER IS TURNED OFF**. They should **NOT** turn the laser on at any point before they have called the instructor over to inspect the setup.

What You Need

For each group of 2-3 students:

- 3 mirrors (3”x3”), mounted in plastic holders
- 1 laser
- 3 paper or plastic protractors
- String
- Roll of masking tape
- Copy of paper target
- 1 yardstick or ruler
- Copy of “STUDENT HANDOUT: Hit the Target” (put Scorecard on the back side)

HINT: The Y bullseye design target requires that students take the planar nature of the law of reflection into account. It is more difficult than the vertical stripes target.

REFLECTION BULLSEYE

Objective

Now that you have had practice measuring and using the law of reflection, you can apply what you've learned to hit a target with a laser by strategically placing mirrors.

The word "LASER" stands for Light Amplification by Stimulated Emission of Radiation. A laser is an optical light source that emits a concentrated beam of photons. Lasers are usually monochromatic – the light that shoots out is usually one wavelength and color, and is in a narrow beam. By contrast, light from a regular incandescent light bulb covers the entire spectrum as well as scatters all over the room. (Which is good, because could you light up a room with a narrow beam of light?).

Your Challenge

- Round 1- Hit the target using one mirror
- Round 2- Hit the target using two mirrors
- Round 3- Hit the target using three mirrors

Materials

(Note: you do not have to use all provided materials)

- 3 mirrors (3"x3"), mounted in plastic holders
- 1 laser
- 3 protractors
- String
- 1 roll of masking tape
- 1 target
- 1 yardstick or ruler

Rules

1. **Most importantly:** the laser must be turned off while you are moving the mirrors.
2. The target must be placed 4 feet away from the laser and not in its direct path.
3. Mirrors must be 1-4 feet away from each other and the laser.
4. Call your instructor over when you are ready to test your setup.
5. Turn on your laser and record your score. You will have three tries to hit the target. After each attempt the laser will be turned off so you can make adjustments. Record your score after each attempt.

Questions for each group to ponder:

- How will you keep track of the laser's path?
- How will you make sure the path you mark is straight?
- Will you decide on the mirror positions first or decide on the path of the laser first?
- How will you use the protractors to predict the path of your reflections?
- Are there other methods of checking that your setup will work?
- How will you manage your time to get in 3 accurate attempts for each round?



Reflection Bullseye Scorecard



You get three attempts to hit the target in each round. If you get a 100, move on to the next Round. Record your scores in the table below.

Round 1 : One mirror

Attempt	Score
1	
2	
3	

Round 1 Best Score : _____

Round 2 : Two mirrors

Attempt	Score
1	
2	
3	

Round 2 Best Score : _____

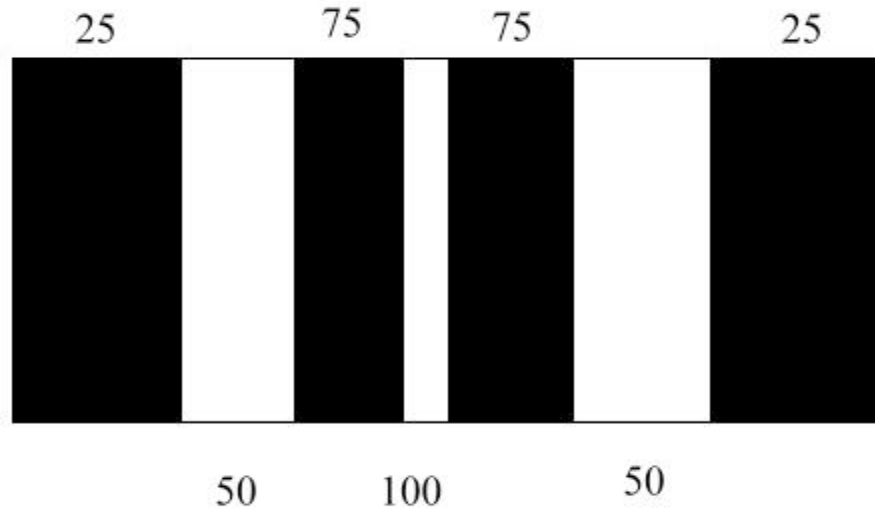
Round 3 : Three mirrors

Attempt	Score
1	
2	
3	

Round 3 Best Score : _____

Grand Total of Best Scores:

Targets for the *Hit the Target* Activity



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