

Name: _____ Date: _____

Operation Midnight Sun: 3rd Grade Light Benders Quiz

Construct solutions for optical puzzles involving total internal reflection in fiber optics and the precision mechanics of periscope Design.

1. A team of deep-sea explorers is using a fiber-optic cable to send light to a dark trench. Why does the light stay inside the curvy cable instead of shining out the sides?

- A. The light turns into electricity inside the wire
- B. The light bounces off the inside walls repeatedly
- C. The cable is painted bright white on the outside
- D. Light naturally curves to follow round objects

2. A magician places a coin at the bottom of a bowl and fills it with water. Even though the coin hasn't moved, it now looks higher up because light ____ as it exits the water.

- A. speeds up and bends
- B. stops moving
- C. reflects backward
- D. turns into a shadow

3. Smooth, shiny surfaces like a polished silver trophy cause light rays to scatter in many different directions.

- A. True
- B. False

4. If you were building a periscope to see over a high wall, how would you need to position the two mirrors to be successful?

- A. Facing each other at 45-degree angles
- B. Flat against the bottom of the tube
- C. Back-to-back in the center of the tube
- D. Facing away from each other at 90 degrees

5. An optometrist gives a patient a pair of glasses. These lenses work because they ____ light to hit the back of the eye perfectly.

- A. block out all
- B. refract
- C. absorb
- D. create

6. A prism creates a 'rainbow' effect because different colors of light bend at slightly different angles when passing through the glass.

- A. True

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B. False

7. You are designing a solar oven. Which material would be most effective at gathering light to create intense heat at one specific point?

- A. A clear flat window pane
- B. A curved, bowl-shaped mirror
- C. A piece of black construction paper
- D. A sheet of frosted plastic

8. Light travels fastest through _____, which is why it bends when it enters a denser material like a glass marble.

- A. deep water
- B. thick honey
- C. the air
- D. solid wood

9. If you shine a flashlight at a blue wall in a completely dark room, why do you see the color blue?

- A. The wall makes its own blue light
- B. The wall absorbs blue and reflects red
- C. Blue light is reflected back to your eyes
- D. The flashlight only contains blue light

10. Light can only be reflected by man-made objects like mirrors and metals.

- A. True
- B. False