Name: _____ **Date:** _____

Answer Key: The Invisible Maze: Light's Secret Path for 4th Grade Optics

Bending rays, bouncing beams, and magnification zones — 10 questions deciphering how light changes speed and direction through different materials.

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1. A scientist is using a magnifying glass to look at a tiny beetle. Why does the beetle look larger through the glass lens?

Answer: B) Light bends as it moves from the air through the curved glass

Lenses work through refraction. The curved shape of the glass bends light rays inward, which makes the image appearing on our retina seem larger than it actually is.

2. When light hits a smooth, shiny surface like a silver spoon and bounces back, this process is known as _____.

Answer: C) Reflection

Reflection occurs when light waves hit a surface that does not absorb the energy, but instead sends it back in a new direction, much like a ball bouncing off a wall.

3. Light travels at the exact same speed whether it is moving through empty space, a pool of water, or a diamond.

Answer: B) False

False. Light slows down when it enters denser materials like water or glass. This change in speed is actually what causes refraction (bending).

4. If you are standing in a dark room and shine a flashlight at a mirror at an angle, where will the light go?

Answer: C) It will bounce off at the same angle it hit the mirror

The Law of Reflection states that the angle of incidence (incoming light) is equal to the angle of reflection (outgoing light).

5. A _____ lens is thicker in the middle than at the edges and is often used in microscopes to bring light rays together.

Answer: B) Convex

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Convex lenses converge light rays toward a central focal point, making them essential for magnifying small objects in tools like microscopes.

6. A prism works by refracting different colors of light at slightly different angles, which separates white light into a rainbow.

Answer: A) True

True. White light is made of all colors. Because each color bends at a slightly different amount when entering the prism, they spread out into a visible spectrum.

7. Why does a swimming pool often look shallower than it actually is when you look down into the water?

Answer: B) Light bends as it exits the water and enters the air

Refraction causes our eyes to see the light coming from the bottom of the pool as if it were at a higher point than it truly is.

8. Security mirrors in store corners are _____ mirrors, which curve outward to show a wider view of the room.

Answer: B) Convex

Convex mirrors curve toward the viewer. This shape spreads light out, allowing a person to see a much larger area than a flat mirror would allow.

9. Light must hit an object and reflect into our eyes for us to be able to see that object.

Answer: A) True

True. Unless an object creates its own light (like the sun), we only see it because light from another source bounces off the object and travels to our eyes.

10. Which of these objects would be best to use if you wanted to demonstrate 'diffuse reflection' (light bouncing off in many messy directions)?

Answer: C) A crumpled piece of aluminum foil

Rough surfaces like crumpled foil have many different angles. When light hits these different surfaces, it bounces off in many directions rather than one clear path.