Name: _____ **Date:** _____

Answer Key: Bending the Beam: 10th Grade Geometric Optics Quiz

Calculate angles of incidence and identify image properties from dental mirrors to fiber optic cables.

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1. When light travels from air into a diamond, it slows down significantly. Which optical phenomenon causes the light path to change direction at the boundary?

Answer: B) Refraction

Refraction is the change in direction of a wave passing from one medium to another caused by its change in speed.

2. According to the Law of Reflection, if a laser hits a smooth surface at an angle of 25 degrees to the normal, the reflected ray will also be at 25 degrees to the normal.

Answer: A) True

The Law of Reflection states that the angle of incidence is equal to the angle of reflection relative to the normal line.

3. A security mirror found in the corner of a grocery store aisle is typically a ____ mirror because it provides a wider field of view.

Answer: C) Convex

Convex mirrors diverge light rays, allowing for a smaller, upright image that covers a much larger area than a flat mirror.

4. Which type of lens is thinner in the middle than at the edges and is commonly used to correct nearsightedness (myopia)?

Answer: C) Diverging lens

Diverging (concave) lenses spread out light rays before they enter the eye, helping focus the image correctly on the retina for nearsighted individuals.

5. Total internal reflection is the principle that allows high-speed data to travel through fiber optic cables.

Answer: A) True

Fiber optics rely on light hitting the boundary of the cable at an angle greater than the critical angle, causing it to reflect entirely back into the core.

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6. When an object is placed very close to a _____ mirror, such as a dentist's tool, the image appears magnified and upright.

Answer: C) Concave

Concave mirrors create a virtual, upright, and magnified image when the object is located between the focal point and the mirror.

7. The 'Index of Refraction' (n) is a dimensionless number that describes how much light bends. What is the formula used to calculate 'n' based on the speed of light?

Answer: A) n = speed of light in vacuum / speed of light in medium

The refractive index is the ratio of the speed of light in a vacuum (c) to the speed of light in the specific material (v).

8. A magnifying glass uses a diverging lens to make small text appear larger.

Answer: B) False

A magnifying glass is a converging (convex) lens. Diverging lenses always produce smaller images.

9. If you are standing 2 meters in front of a flat plane mirror, how far away from you does your image appear to be?

Answer: C) 4 meters

In a plane mirror, the image distance is equal to the object distance. Since the image is 2m behind the glass and you are 2m in front, the total distance is 4m.

10. The point on the principal axis where parallel light rays meet after passing through a converging lens is called the _____.

Answer: B) Focal Point

The focal point is the specific location where light rays parallel to the axis converge after refraction or reflection.