SECTION 5.1 ASSESSMENT, p. 181

Check Your Understanding Answers

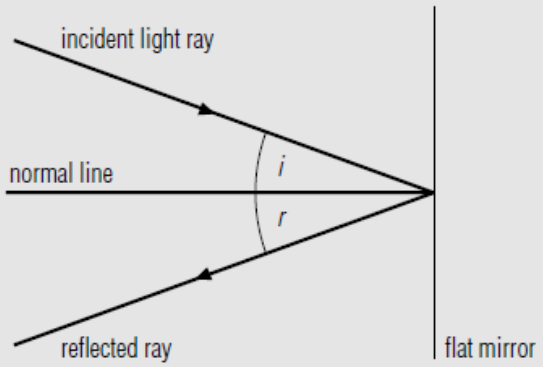
Checking Concepts

1. (a) Translucent and transparent materials can both transmit light; however, an object can be seen clearly only through a transparent material.
(b) Light rays are either transmitted or absorbed by a material. Transmitted light rays continue to pass through an object, while absorbed light rays are not allowed to pass through the object.
(c) Reflection and refraction are both processes that affect the direction of a light ray. Reflection causes the light direction to be reversed, according to the law of reflection. Refraction causes the light rays to be bent as they pass through an object.
2. If the angle of incidence is 43º, then the angle of reflection is also 43º.
3. Students' answers may vary. Sample answer: Imagine the movement of light using the wave model. As the front of the light wave moves into water, it begins to slow down. However, the part of the wave front that has not yet hit the water is still moving fast.
This causes the wave front to turn. This changes the direction of the light wave.
4. A smooth piece of aluminum reflects light waves in an orderly way, allowing an image to be seen in its reflection. A crumpled ball of foil has a surface that is not smooth, so light rays reflect from it randomly. This scrambles the light rays and prevents a clearly reflected image from forming.
5. Even during daylight, a glass window will reflect a small amount of light. However, this reflection is not usually noticeable because of all the light passing through the window from the outside. At night, there is almost no light coming in from the outside, so the small amount of reflected light becomes visible.

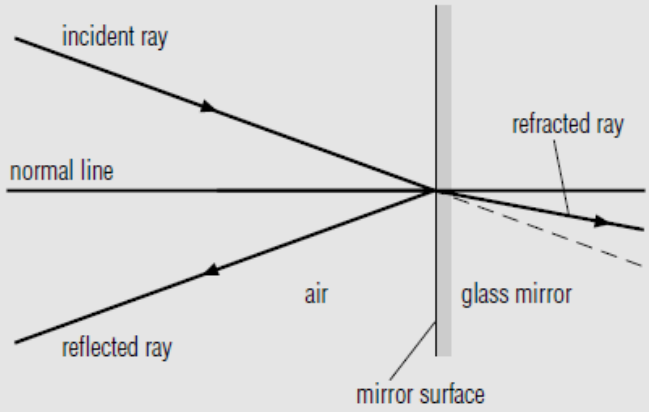
Understanding Key Ideas

6. A mirage forms on a hot day when the ground warms up, which causes the air just above the ground to heat up and become less dense. The air layer above this is denser. Light passing through these layers tends to be reflected up into the viewer's eyes rather than transmitted into the ground. Light passing through these layers forms the mirage.
7. (a) In a ray diagram, the normal is an imaginary line that is perpendicular to the surface doing the reflecting.
(b) The term "normal" has the same meaning when representing refraction as when representing reflection—the imaginary line perpendicular to the mirror or boundary where the incident ray strikes.
8. The reflection of the "d" is a "b" because the left side of the "d", which is the farthest part of the letter in front of the mirror, is reflected as the right side of "b," which appears to be the farthest inside the mirror.

9.



10.



11. When the pages of a book are too smooth or glossy, the text can be difficult to read because of the high amount of reflection. Slightly rougher paper does not have the same glare.

Pause and Reflect Answer

Students' answers may vary. Sample answer: X rays and gamma rays are part of the electromagnetic spectrum and propagate as waves, just as light does. All waves, including these, can reflect, but only if the material they hit does not absorb or transmit them. It is not obvious which kinds of materials will reflect these particular kinds of rays.