Concept Items

16.1 Reflection 1.

Part A. Can you see a virtual image? Part B. Can you photograph one? Explain your answers.

a. A. yes; B. No, an image from a flat mirror cannot be photographed.
b. A. no; B. Yes, an image from a flat mirror can be photographed.
c. A. yes; B. Yes, an image from a flat mirror can be photographed.
d. A. no; B. No, an image from a flat mirror cannot be photographed.

2.

State the law of reflection.

a. $\vartheta_r = \vartheta_i$, where ϑ_r is the angle of reflection and ϑ_i is the angle of incidence.
b. $\vartheta_r > \vartheta_i$, where ϑ_r is the angle of reflection and ϑ_i is the angle of incidence.
c. $\vartheta_r < \vartheta_i$, where ϑ_r is the angle of reflection and ϑ_i is the angle of incidence.
d. $\vartheta_r = 0$, where ϑ_r is the angle of reflection.

16.2 Refraction 3.

Does light change direction toward or away from the normal when it goes from air to water? Explain.

a. The light bends away from the normal because the index of refraction of water is greater than that of air.
b. The light bends away from the normal because the index of refraction of air is greater than that of water.
c. The light bends toward the normal because the index of refraction of water is greater than that of air.
d. The light bends toward the normal because the index of refraction of air is greater than that of water.

16.3 Lenses 4.

An object is positioned in front of a lens with its base resting on the principal axis. Describe two rays that could be traced from the top of the object and through the lens that would locate the top of an image.

a. A ray perpendicular to the axis and a ray through the center of the lens
b. A ray parallel to the axis and a ray that does not pass through the center of the lens
c. A ray parallel to the axis and a ray through the center of the lens
d. A ray parallel to the axis and a ray that does not pass through the focal point

5.

A person timing the moonrise looks at her watch and then at the rising moon. Describe what happened inside her eyes that allowed her to see her watch clearly one second and then see the moon clearly.

a. The shape of the lens was changed by the sclera, and thus its focal length was also changed, so that each of the images focused on the retina.
b. The shape of the lens was changed by the choroid, and thus its focal length was also changed, so that each of the images focused on the retina.
c. The shape of the lens was changed by the iris, and thus its focal length was also changed, so that each of the images focused on the retina.
d. The shape of the lens was changed by the muscles, and thus its focal length was also changed, so that each of the images focused on the retina.

6.

For a concave lens, if the image distance, d_{i}, is negative, where does the image appear to be with respect to the object?

a. The image always appears on the same side of the lens.
b. The image appears on the opposite side of the lens.
c. The image appears on the opposite side of the lens only if the object distance is greater than the focal length.
d. The image appears on the same side of the lens only if the object distance is less than the focal length.