Multiple Choice

16.1 Reflection 19.

In geometric optics, a straight line emerging from a point is called a (an) _____.

a. ray
b. focal point
c. image
d. object distance

20.

An image of a 2.0 -cm object reflected from a mirror is 5.0 cm tall. What is the magnification of the mirror?

a. 0.4
b. 2.5
c. 3
d. 10

21.

Can a virtual image be projected onto a screen with additional lenses or mirrors? Explain your answer.

a. Yes, the rays actually meet behind the lens or mirror.
b. No, the image is formed by rays that converge to a point in front of the mirror or lens.
c. Yes, any image that can be seen can be manipulated so that it can be projected onto a screen.
d. No, the image can only be perceived as being behind the lens or mirror.

16.2 Refraction 22.

What does c represent in the equation $n = \frac{c}{v}$?

a. the critical angle
b. the refractive index
c. the speed of light in a vacuum
d. the speed of light in a transparent material

23.

What is the term for the minimum angle at which a light ray is reflected back into a material and cannot pass into the surrounding medium?

a. critical angle
b. incident angle
c. angle of refraction
d. angle of reflection

24.

Consider these indices of refraction: glass: 1.52, air: 1.0003, water: 1.333. Put these materials in order from the one in which the speed of light is fastest to the one in which it is slowest.

a. The speed of light in water > the speed of light in air > the speed of light in glass.
b. The speed of light in glass > the speed of light in water > the speed of light in air.
c. The speed of light in air > the speed of light in water > the speed of light in glass.
d. The speed of light in glass > the speed of light in air > the speed of light in water.

25.

Explain why an object in water always appears to be at a depth that is more shallow than it actually is.

a. Because of the refraction of light, the light coming from the object bends toward the normal at the interface of water and air. This causes the object to appear at a location that is above the actual position of the object. Hence, the image appears to be at a depth that is more shallow than the actual depth.
b. Because of the refraction of light, the light coming from the object bends away from the normal at the interface of water and air. This causes the object to appear at a location that is above the actual position of the object. Hence, the image appears to be at a depth that is more shallow than the actual depth.
c. Because of the refraction of light, the light coming from the object bends toward the normal at the interface of water and air. This causes the object to appear at a location that is below the actual position of the object. Hence, the image appears to be at a depth that is more shallow than the actual depth.
d. Because of the refraction of light, the light coming from the object bends away from the normal at the interface of water and air. This causes the object to appear at a location that is below the actual position of the object. Hence, the image appears to be at a depth that is more shallow than the actual depth.

16.3 Lenses 26.

For a given lens, what is the height of the image divided by the height of the object ($\frac{h_i}{h_o}$) equal to?

a. power
b. focal length
c. magnification

d. radius of curvature

27.

Which part of the eye has the greatest density of light receptors?

a. the lens
b. the fovea
c. the optic nerve
d. the vitreous humor

28.

What is the power of a lens with a focal length of 10 cm?

a. 10 m^{-1}, or 10 D
b. 10 cm^{-1}, or 10 D
c. 10 m, or 10 D
d. 10 cm, or 10 D

29.

Describe the cause and result of chromatic aberration.

a. Chromatic aberration results from the dependence of the frequency of light on the refractive index, which causes dispersion of different colors of light by a lens so that each color has a different focal point.
b. Chromatic aberration results from the dispersion of different wavelengths of light by a curved mirror so that each color has a different focal point.
c. Chromatic aberration results from the dependence of the reflection angle at a spherical mirror's surface on the distance of light rays from the principal axis so that different colors have different focal points.
d. Chromatic aberration results from the dependence of the wavelength of light on the refractive index, which causes dispersion of different colors of light by a lens so that each color has a different focal point.