Phys.12-Q3W2-Refraction-Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. A lapidary cuts a diamond so that the light will refract at an angle of 17.0° to the normal. What is the index of refraction of the diamond when the angle of incidence is 45.0°?
   a. 0.74
   b. 2.42
   c. 1.23
   d. 0.41

_____ 2. In what direction does a parallel ray from an object proceed after passing through a converging lens?
   a. The ray continues parallel to the principal axis.
   b. The ray passes through the center of the lens.
   c. The ray passes through the focal point, F.
   d. The ray is directed away from the focal point, F.

_____ 3. A film projector produces a 1.51 m image of a horse on a screen. If the projector lens is 4.00 m from the screen and the size of the horse on the film is 1.07 cm, what is the magnitude of the magnification of the image?
   a. 14.1
   b. 141
   c. 7.08×10^{-3}
   d. 0.708

_____ 4. A virtual image has a _____ image distance (q) and is located in _____ of the lens.
   a. negative, back
   b. positive, front
   c. positive, back
   d. negative, front

_____ 5. Which is an example of refraction?
   a. Light is bent slightly around corners.
   b. A fish appears closer to the surface of the water than it really is when observed from a riverbank.
   c. In a mirror, when you lift your right arm, the left arm of your image is raised.
   d. A parabolic mirror in a headlight focuses light into a beam.

_____ 6. When a light ray passes from zircon ($n = 1.923$) into fluorite ($n = 1.434$) at an angle of 60°, its path is
   a. bent toward the normal.
   b. bent away from the normal.
   c. parallel to the normal.
   d. not bent.

_____ 7. An object is placed 14.0 cm from a diverging lens. If a virtual image appears 10.0 cm from the lens on the same side as the object, what is the focal length of the lens?
   a. –34 cm
   b. –5.8 cm
   c. –50 cm
   d. –1.6 cm

_____ 8. When a light ray moves from air into glass, which has a higher index of refraction, its path is
   a. bent toward the normal.
   b. bent away from the normal.
   c. parallel to the normal.
   d. not bent.

_____ 9. Light is *not* refracted when it is
   a. traveling from air into a glass of water at an angle of 35° to the normal.
   b. traveling from air into a diamond at an angle of 45°.
   c. traveling from water into air at an angle of 35° to the normal.
   d. striking a wood surface at an angle of 75°.

_____ 10. In what direction does a focal ray from an object proceed after passing through a diverging lens?
   a. The ray intersects with the center of curvature, C.
   b. The ray passes through the center of the lens.
   c. The ray passes through the focal point, F.
   d. The ray exits the lens parallel to the principal axis.

_____ 11. How many focal points and focal lengths do converging and diverging lenses have?
    a. one, two   c. one, one
    b. two, one   d. two, two

_____ 12. The focal length for a diverging lens is
    a. dependent on the location of the object.
    b. dependent on the location of the image.
    c. always negative.
    d. always positive.

_____ 13. A ray of light in air is incident on an air-to-glass boundary at an angle of exactly 30.0° with the normal. If the index of refraction of the glass is 1.65, what is the angle of the refracted ray within the glass with respect to the normal?
    a. 58.3°   c. 18.0°
    b. 34.4°   d. 37.3°

_____ 14. Atmospheric refraction of light rays is responsible for which of the following effects?
    a. chromatic aberration   c. total internal reflection in a gemstone
    b. mirages   d. spherical aberration

_____ 15. Which is *not* correct when describing the formation of rainbows?
    a. Sunlight is internally reflected on the back side of a raindrop.
    b. All wavelengths refract at the same angle.
    c. A rainbow is really spherical in nature.
    d. Sunlight is spread into a spectrum when it enters a spherical raindrop.

_____ 16. If atmospheric refraction did not occur, how would the apparent time of sunrise and sunset be changed?
    a. Both would be later.
    b. Sunrise would be later, and sunset would be earlier.
    c. Both would be earlier.
    d. Sunrise would be earlier, and sunset would be later.

_____ 17. The _____ of light can change when light is refracted because the medium changes.
    a. transparency   c. wavelength
    b. frequency   d. medium

_____ 18. When a light ray passes from water ($n = 1.333$) into diamond ($n = 2.419$) at an angle of 45°, its path is
    a. not bent.   c. parallel to the normal.
    b. bent toward the normal.   d. bent away from the normal.

_____ 19. A beam of light in air is incident at an angle of 35° to the surface of a rectangular block of clear plastic ($n = 1.49$). What is the angle of refraction?
    a. 57°   c. 12°
    b. 42°   d. 23°

_____ 20. When light passes at an angle to the normal from one material into another material in which its speed is higher,
    a. it is unaffected.
    b. it is bent toward the normal to the surface.
    c. it always lies along the normal to the surface.
    d. it is bent away from the normal to the surface.

_____ 21. An object that is 18 cm from a converging lens forms a real image 22.5 cm from the lens. What is the magnification of the image?
    a. 0.80   c. 1.25
    b. −1.25   d. −0.80

_____ 22. All of the following images can be formed by a converging lens *except* which one?
    a. real, inverted, and magnified
    b. real, upright, and magnified
    c. virtual, upright, and magnified
    d. real and point

_____ 23. What type of image is formed when rays of light actually intersect?
    a. projected
    b. curved
    c. virtual
    d. real

_____ 24. The focal length for a converging lens is
    a. dependent on the location of the object.
    b. always positive.
    c. dependent on the location of the image.
    d. always negative.

_____ 25. When light passes at an angle to the normal from one material into another material in which its speed is lower,
    a. it is bent toward the normal to the surface.
    b. it always lies along the normal to the surface.
    c. it is unaffected.
    d. it is bent away from the normal to the surface.

_____ 26. The _____ of light can change when light is refracted because the velocity changes.
    a. wavelength
    b. transparency
    c. frequency
    d. medium

_____ 27. In what direction does a focal ray from an object proceed after passing through a converging lens?
    a. The ray intersects with the center of curvature, C.
    b. The ray passes through the center of the lens.
    c. The ray passes through the focal point, F.
    d. The ray exits the lens parallel to the principal axis.

_____ 28. An object is placed 20.0 cm from a thin converging lens along the axis of the lens. If a real image forms behind the lens at a distance of 8.00 cm from the lens, what is the focal length of the lens?
    a. 12.0 cm
    b. –13.3 cm
    c. 13.3 cm
    d. 5.71 cm

_____ 29. Carbon tetrachloride ($n = 1.46$) is poured into a container made of crown glass ($n = 1.52$). If a light ray in the glass is incident on the glass-to-liquid boundary and makes an angle of 30.0° with the normal, what is the angle of the corresponding refracted ray with respect to the normal?
    a. 28.7°
    b. 25.6°
    c. 31.4°
    d. 64.4°

_____ 30. All of the following images can be formed by a converging lens *except* which one?
    a. image at infinity
    b. real, inverted, and same size
    c. real, inverted, and reduced
    d. virtual, inverted, and same size

======================