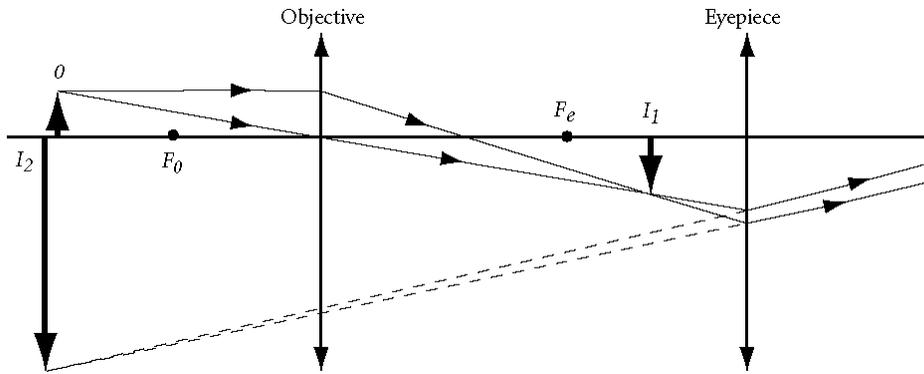


## Physics G12-Q3W4-Revision on light-H.W

### Multiple Choice

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

- \_\_\_ 1. In what direction does a parallel ray from an object proceed after passing through a diverging lens?
- The ray passes through the center of the lens.
  - The ray passes through the center of curvature,  $C$ .
  - The ray is directed away from the focal point,  $F$ .
  - The ray continues parallel to the principal axis.
- \_\_\_ 2. If a light ray strikes a flat mirror at an angle of  $30^\circ$  from the normal, the ray will be reflected at an angle of
- $60^\circ$  from the mirror's surface.
  - $30^\circ$  from the mirror's surface.
  - $60^\circ$  from the normal.
  - $90^\circ$  from the normal.
- \_\_\_ 3. In a laser, energy is added to a(n)
- light wave.
  - partially transparent mirror.
  - active medium.
  - mirror.
- \_\_\_ 4. What type of image does a converging lens produce?
- real
  - real or virtual
  - virtual
  - none of the above
- \_\_\_ 5. If a light ray strikes a flat mirror at an angle of  $14^\circ$  from the normal, the reflected ray will be
- $14^\circ$  from the normal.
  - $14^\circ$  from the mirror's surface.
  - $76^\circ$  from the normal.
  - $90^\circ$  from the mirror's surface.
- \_\_\_ 6. For a spherical mirror, the focal length is equal to \_\_\_ the radius of curvature of the mirror.
- one-half
  - one-fourth
  - one-third
  - the square of
- \_\_\_ 7. A beam of light in air is incident at an angle of  $35^\circ$  to the surface of a rectangular block of clear plastic ( $n = 1.49$ ). What is the angle of refraction?
- $12^\circ$
  - $57^\circ$
  - $42^\circ$
  - $23^\circ$
- \_\_\_ 8. 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?
- 0.80
  - 0.80
  - 1.25
  - 1.25
- \_\_\_ 9. What is the frequency of infrared light of  $1.0 \times 10^{-4}$  m wavelength?
- $3.0 \times 10^4$  Hz
  - $3.0 \times 10^8$  Hz
  - $3.0 \times 10^{12}$  Hz
  - $3.0 \times 10^{14}$  Hz



- \_\_\_ 10. In the diagram of a compound microscope shown above, where would you place the slide?
- at  $O$
  - at  $I_2$
  - at  $F_o$
  - at  $I_1$
- \_\_\_ 11. All of the following images can be formed by a converging lens *except* which one?
- virtual, upright, and magnified
  - real, inverted, and magnified
  - real, upright, and magnified
  - real and point
- \_\_\_ 12. The mirror equation and ray diagrams are valid concepts only for what type of rays?
- parallel rays
  - intersecting rays
  - perpendicular rays
  - paraxial rays
- \_\_\_ 13. In a double-slit interference pattern, the path length from one slit to the first bright fringe of a double-slit interference pattern is longer than the path length from the other slit to the fringe by
- one full wavelength.
  - one-quarter of a wavelength.
  - three-quarters of a wavelength.
  - one-half of a wavelength.
- \_\_\_ 14. Which of the following is *not* a primary subtractive color?
- yellow
  - blue
  - cyan
  - magenta
- \_\_\_ 15. Which of the following is a device that produces an intense, nearly parallel beam of coherent light?
- spectroscope
  - telescope
  - diffraction grating
  - laser
- \_\_\_ 16. The \_\_\_ of light can change when light is refracted because the medium changes.
- frequency
  - wavelength
  - transparency
  - medium
- \_\_\_ 17. Which of the following is *not* an additive primary color?
- green
  - blue
  - yellow
  - red
- \_\_\_ 18. A concave mirror forms a real image at 25.0 cm from the mirror surface along the principal axis. If the corresponding object is at a 10.0 cm distance, what is the mirror's focal length?
- 1.40 cm
  - 17.0 cm
  - 7.14 cm
  - 12.0 cm
- \_\_\_ 19. The focal length for a diverging lens is
- dependent on the location of the object.
  - always positive.
  - always negative.
  - dependent on the location of the image.
- \_\_\_ 20. Snow reflects almost all of the light incident upon it. However, a single beam of light is not reflected in the form of parallel rays. This is an example of \_\_\_ reflection off a \_\_\_ surface.
- regular, specular
  - diffuse, specular

b. diffuse, rough

d. regular, rough

\_\_\_\_\_ 21. Light with a wavelength of 546.1 nm passes through a  $6.62 \times 10^3$  lines/cm diffraction grating. What is the first-order angle of diffraction?

a.  $34.6^\circ$

c.  $39.2^\circ$

b.  $41.6^\circ$

d.  $21.2^\circ$

\_\_\_\_\_ 22. Which is *not* correct when describing the formation of rainbows?

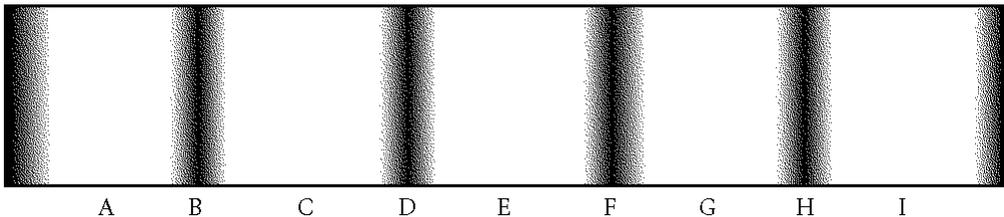
a. Sunlight is internally reflected on the back side of a raindrop.

b. A rainbow is really spherical in nature.

c. All wavelengths refract at the same angle.

d. Sunlight is spread into a spectrum when it enters a spherical raindrop.

- \_\_\_ 23. A parabolic mirror, instead of a spherical mirror, can be used to reduce the occurrence of which effect?
- light scattering
  - spherical aberration
  - mirages
  - chromatic aberration
- \_\_\_ 24. Which of the following is the process of using a light wave to produce more waves with properties identical to those of the first wave?
- active medium
  - hologram
  - stimulated emission
  - bandwidth
- \_\_\_ 25. In a double-slit interference experiment, a wave from one slit arrives at a point on a screen one-half wavelength behind the wave from the other slit. What is observed at that point?
- multicolored fringe
  - dark fringe
  - bright fringe
  - gray fringe, neither dark nor bright
- \_\_\_ 26. What is the frequency of an electromagnetic wave with a wavelength of  $1.0 \times 10^{-5}$  m?
- $1.0 \times 10^3$  Hz
  - $3.0 \times 10^8$  Hz
  - $3.3 \times 10^{13}$  Hz
  - $3.0 \times 10^4$  Hz
- \_\_\_ 27. Which best describes the image of a concave mirror when the object is located somewhere between the focal point and twice the focal-point distance from the mirror?
- real, inverted, and magnification less than one
  - virtual, upright, and magnification greater than one
  - real, inverted, and magnification greater than one
  - virtual, upright, and magnification less than one
- \_\_\_ 28. When parallel rays that are also parallel to the principal axis strike a spherical mirror, rays that strike the mirror \_\_\_ the principal axis are focused at the focal point. Those rays that strike the mirror \_\_\_ the principal axis are focused at points between the mirror and the focal point.
- close to, perpendicular to
  - perpendicular to, far from
  - close to, far from
  - far from, close to

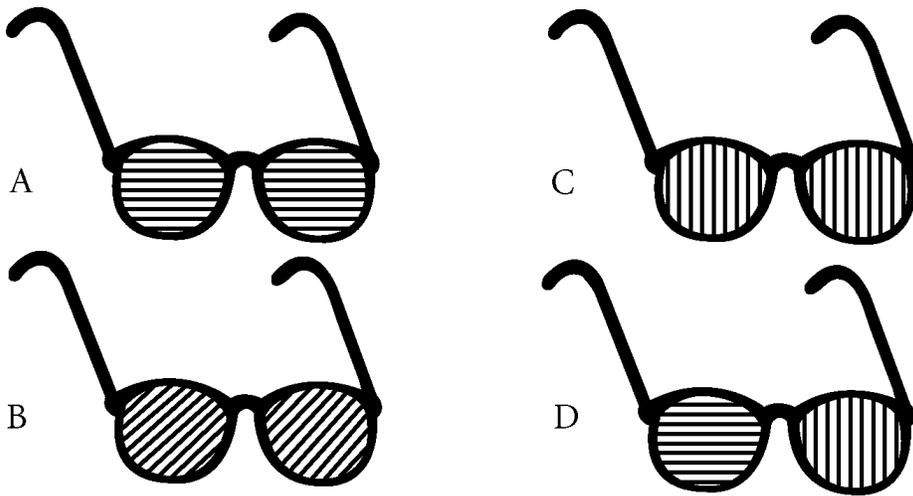


The figure above shows the pattern of a double-slit interference experiment. The center of the pattern is located at E.

- \_\_\_ 29. In the figure above, which fringe represents a second-order minimum?
- F
  - E
  - G
  - H
- \_\_\_ 30. In the figure above,  $\theta_1$  is the angle between the central maximum and the first-order maximum. What is the angle between fringes D and F?
- $\theta_1$
  - $2\theta_1$
  - $\frac{3\theta_1}{2}$
  - $\frac{\theta_1}{2}$

- \_\_\_ 31. Light is *not* refracted when it is
- traveling from water into air at an angle of  $35^\circ$  to the normal.
  - traveling from air into a diamond at an angle of  $45^\circ$ .
  - traveling from air into a glass of water at an angle of  $35^\circ$  to the normal.
  - striking a wood surface at an angle of  $75^\circ$ .
- \_\_\_ 32. Light with a wavelength of 400.0 nm passes through a  $1.00 \times 10^4$  lines/cm diffraction grating. What is the second-order angle of diffraction?
- $21.3^\circ$
  - $53.1^\circ$
  - $56.5^\circ$
  - $72.1^\circ$
- \_\_\_ 33. In what direction does a focal ray from an object proceed after passing through a diverging lens?
- The ray intersects with the center of curvature,  $C$ .
  - The ray passes through the focal point,  $F$ .
  - The ray exits the lens parallel to the principal axis.
  - The ray passes through the center of the lens.
- \_\_\_ 34. How many focal points and focal lengths do converging and diverging lenses have?
- one, one
  - two, one
  - two, two
  - one, two
- \_\_\_ 35. The distance between two slits in a double-slit interference experiment is 0.0050 mm. What is the angle of the third-order bright fringe ( $m = 3$ ) produced with light of 550 nm?
- $12^\circ$
  - $9.9^\circ$
  - $19^\circ$
  - $5.0^\circ$
- \_\_\_ 36. 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?
- 14.1
  - $7.08 \times 10^{-3}$
  - 141
  - 0.708
- \_\_\_ 37. A highly polished finish on a new car provides a \_\_\_ surface for \_\_\_ reflection.
- smooth, specular
  - specular, diffused
  - rough, regular
  - rough, diffused
- \_\_\_ 38. What type of mirror is used whenever a magnified image of an object is needed?
- two-way mirror
  - convex mirror
  - flat mirror
  - concave mirror
- \_\_\_ 39. If you are reading a book and you move twice as far away from the light source, how does the brightness at the new distance compare with that at the old distance? It is
- one-half as bright.
  - one-eighth as bright.
  - one-fourth as bright.
  - twice as bright.
- \_\_\_ 40. When a straight line is drawn perpendicular to a flat mirror at the point where an incoming ray strikes the mirror's surface, the angles of incidence and reflection are measured from the normal and
- the angles of incidence and reflection are equal.
  - the angle of incidence can be greater than or less than the angle of reflection.
  - the angle of incidence is less than the angle of reflection.
  - the angle of incidence is greater than the angle of reflection.
- \_\_\_ 41. A helium-neon laser shines monochromatic light ( $\lambda = 632.8$  nm) perpendicular to the surface of a diffraction grating that contains 146 230 lines/m. Find the angles at which one would observe the second-order and third-order maxima.
- $\theta_1 = 10.66^\circ$ ;  $\theta_2 = 18.43^\circ$
  - $\theta_1 = 10.66^\circ$ ;  $\theta_2 = 16.11^\circ$
  - $\theta_1 = 5.307^\circ$ ;  $\theta_2 = 10.66^\circ$
  - $\theta_1 = 13.25^\circ$ ;  $\theta_2 = 26.50^\circ$

- \_\_\_ 42. For stable interference to occur, the phase difference must be
- $\frac{1}{2} \lambda$ .
  - constant.
  - monochromatic.
  - incoherent.
- \_\_\_ 43. When a light ray moves from air into glass, which has a higher index of refraction, its path is
- not bent.
  - bent toward the normal.
  - parallel to the normal.
  - bent away from the normal.



- \_\_\_ 44. Which pair of glasses shown above is best suited for automobile drivers? The transmission axes are shown by straight lines on the lenses. (Hint: The light reflects off the hood of the car.)
- D
  - A
  - C
  - B
- \_\_\_ 45. When red light and green light shine on the same place on a piece of white paper, the spot appears to be
- brown.
  - white.
  - black.
  - yellow.
- \_\_\_ 46. A mirror has an object located on its principal axis 40.0 cm from the mirror's surface. A virtual image is formed 15.0 cm behind the mirror. What is the mirror's focal length?
- 13 cm
  - 10.9 cm
  - 2.38 cm
  - 24.0 cm
- \_\_\_ 47. 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?
- 5.8 cm
  - 50 cm
  - 1.6 cm
  - 34 cm
- \_\_\_ 48. The acronym *laser* stands for light amplification by \_\_\_ emission of radiation.
- simultaneous
  - stimulated
  - similar
  - spontaneous
- \_\_\_ 49. If a light ray strikes a flat mirror at an angle of  $29^\circ$  from the normal, the reflected ray will be
- $27^\circ$  from the normal.
  - $61^\circ$  from the normal.
  - $29^\circ$  from the mirror's surface.
  - $29^\circ$  from the normal.
- \_\_\_ 50. Refraction is the bending of a wave disturbance as it passes at an angle from one \_\_\_ into another.
- boundary
  - glass
  - area
  - medium

- \_\_\_\_\_ 51. When a light ray passes from water ( $n = 1.333$ ) into diamond ( $n = 2.419$ ) at an angle of  $45^\circ$ , its path is
- parallel to the normal.
  - not bent.
  - bent toward the normal.
  - bent away from the normal.
- \_\_\_\_\_ 52. In what direction does a focal ray from an object proceed after passing through a converging lens?
- The ray passes through the center of the lens.
  - The ray intersects with the center of curvature,  $C$ .
  - The ray exits the lens parallel to the principal axis.
  - The ray passes through the focal point,  $F$ .
- \_\_\_\_\_ 53. In what direction does a parallel ray from an object proceed after passing through a converging lens?
- The ray continues parallel to the principal axis.
  - The ray passes through the focal point,  $F$ .
  - The ray is directed away from the focal point,  $F$ .
  - The ray passes through the center of the lens.
- \_\_\_\_\_ 54. Which portion of the electromagnetic spectrum is used in a television?
- radio waves
  - X rays
  - infrared waves
  - gamma waves
- \_\_\_\_\_ 55. In a double-slit interference experiment, a wave from one slit arrives at a point on a screen one wavelength behind the wave from the other slit. What is observed at that point?
- bright fringe
  - dark fringe
  - gray fringe, neither dark nor bright
  - multicolored fringe
- \_\_\_\_\_ 56. Which of the following best describes the image produced by a flat mirror?
- virtual, inverted, and magnification greater than one
  - virtual, upright, and magnification equal to one
  - real, upright, and magnification equal to one
  - real, inverted, and magnification less than one
- \_\_\_\_\_ 57. The farther light is from a source,
- the more spread out light becomes.
  - the more light is available per unit area.
  - the more bright light becomes.
  - the more condensed light becomes.
- \_\_\_\_\_ 58. If you looked at a light through the lenses from two polarizing sunglasses that were overlapped at right angles to each other,
- none of the light would pass through.
  - little of the light would pass through.
  - all of the light would pass through.
  - most of the light would pass through.
- \_\_\_\_\_ 59. As the angle between the electric-field waves and the transmission axis increases,
- the component of light that passes through the polarizer increases and the brightness of the light decreases.
  - the component of light that passes through the polarizer decreases and the brightness of the light decreases.
  - the component of light that passes through the polarizer decreases and the brightness of the light increases.
  - the component of light that passes through the polarizer increases and the brightness of the light increases.
- \_\_\_\_\_ 60. Monochromatic light shines on the surface of a diffraction grating with  $5.3 \times 10^3$  lines/cm. The first-order maximum is observed at an angle of  $17^\circ$ . Find the wavelength.
- 420 nm
  - 530 nm
  - 520 nm
  - 550 nm

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