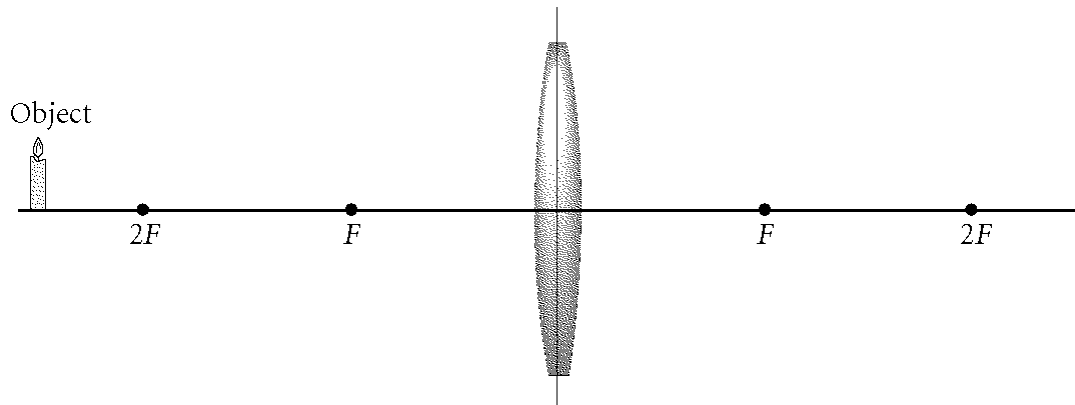


Cp physics - Test ch 15 Refraction**Multiple Choice**

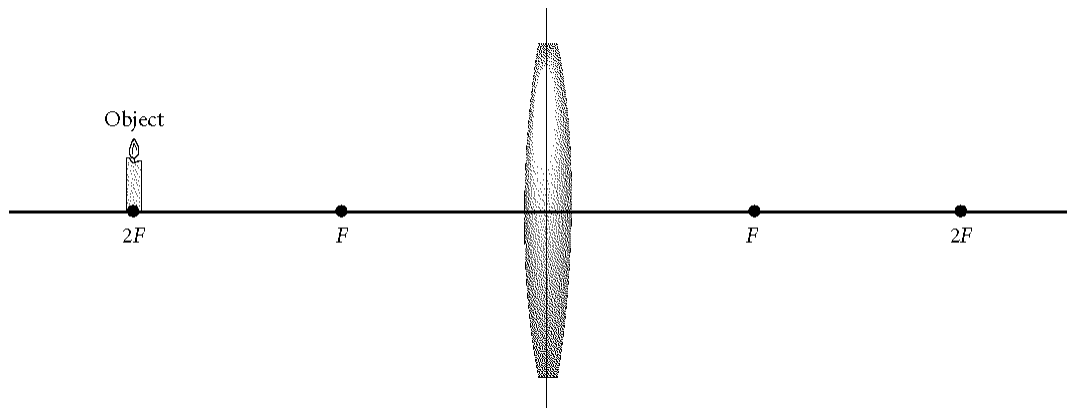
Identify the choice that best completes the statement or answers the question.

- _____ 1. Part of a pencil that is placed in a glass of water appears bent in relation to the part of the pencil that extends out of the water. What is this phenomenon called?
- interference
 - refraction
 - diffraction
 - reflection
- _____ 2. Refraction is the bending of a wave disturbance as it passes at an angle from one _____ into another.
- glass
 - medium
 - area
 - boundary
- _____ 3. When light passes at an angle to the normal from one material into another material in which its speed is higher,
- it is bent toward the normal to the surface.
 - it always lies along the normal to the surface.
 - it is unaffected.
 - it is bent away from the normal to the surface.
- _____ 4. When a light ray passes from water ($n = 1.333$) into diamond ($n = 2.419$) at an angle of 45° , its path is
- bent toward the normal.
 - bent away from the normal.
 - parallel to the normal.
 - not bent.
- _____ 5. 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?
- 58.3°
 - 37.3°
 - 34.4°
 - 18.0°
- _____ 6. 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?
- 12°
 - 23°
 - 42°
 - 57°
- _____ 7. 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?
- 25.6°
 - 28.7°
 - 31.4°
 - 64.4°
- _____ 8. 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° ?
- 0.41
 - 0.74
 - 1.23
 - 2.42
- _____ 9. The focal length for a converging lens is
- always positive.
 - always negative.
 - dependent on the location of the object.
 - dependent on the location of the image.

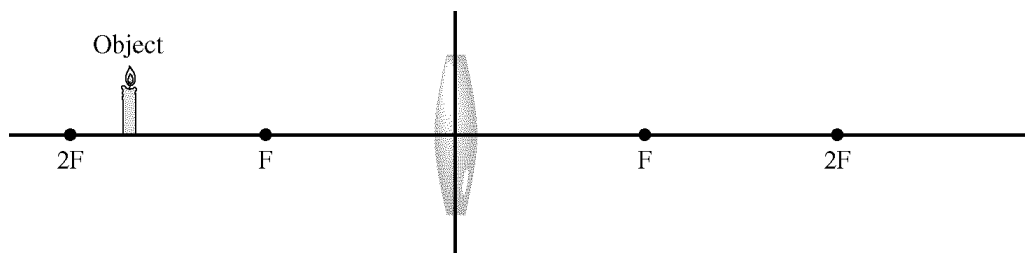
- _____ 10. A virtual image has a _____ image distance (q) and is located in _____ of the lens.
- a. positive, front
 - b. positive, back
 - c. negative, front
 - d. negative, back
- _____ 11. The focal length for a diverging lens is
- a. always positive.
 - b. always negative.
 - c. dependent on the location of the object.
 - d. dependent on the location of the image.
- _____ 12. 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. 5.71 cm
 - b. 12.0 cm
 - c. -13.3 cm
 - d. 13.3 cm
- _____ 13. 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. -50 cm
 - b. -34 cm
 - c. -5.8 cm
 - d. -1.6 cm
- _____ 14. 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. 141
 - b. 14.1
 - c. 0.708
 - d. 7.08×10^{-3}
- _____ 15. 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. -1.25
 - b. -0.80
 - c. 0.80
 - d. 1.25
- _____ 16. Which of the following describes what will happen to a light ray incident on a glass-to-air boundary at greater than the critical angle?
- a. total internal reflection
 - b. total external transmission
 - c. partial reflection, partial transmission
 - d. partial reflection, total transmission
- _____ 17. Atmospheric refraction of light rays is responsible for which of the following effects?
- a. spherical aberration
 - b. mirages
 - c. chromatic aberration
 - d. total internal reflection in a gemstone
- _____ 18. Which is *not* correct when describing the formation of rainbows?
- a. A rainbow is really spherical in nature.
 - b. Sunlight is spread into a spectrum when it enters a spherical raindrop.
 - c. Sunlight is internally reflected on the back side of a raindrop.
 - d. All wavelengths refract at the same angle.

Short Answer

19. What is the position and kind of image produced by the lens shown above? Draw a ray diagram to support your answer.
20. A student burns a hole in a pencil with a magnifying lens. What is the position and kind of image produced by the lens? Draw a ray diagram to support your answer.



21. What is the position and kind of image produced by the lens shown above? Draw a ray diagram to support your answer.



22. What is the position and kind of image produced by the lens shown above? Draw a ray diagram to support your answer.

23. An object is placed 40.0 cm from a converging lens along the axis of the lens. If a virtual image forms at a distance of 50.0 cm from the lens on the same side as the object, what is the focal length of the lens?

Problem

24. A ray of light passes from air into carbon disulfide ($n = 1.63$) at an angle of 28.0° to the normal. What is the refracted angle?
25. A ray of light passes from air into cubic zirconia at an angle of 56.0° to the normal. The angle of refraction is 22.0° . What is the index of refraction of cubic zirconia?
26. A ray of light passes from air into ice ($n = 1.309$) at an angle of 46.0° to the normal. The refracted ray of light then passes from ice into glycerine ($n = 1.473$). What is the angle of refraction of the ray of light in glycerine?
27. A ray of light passes from air into carbon disulfide ($n = 1.628$) at an angle of 55.0° to the normal. The refracted ray of light then passes from carbon disulfide into water ($n = 1.333$). What is the refracted angle in the water?
28. An object is placed along the principal axis of a thin converging lens that has a focal length of 16 cm. If the distance from the object to the lens is 24 cm, what is the distance from the image to the lens?
29. An object is placed along the principal axis of a thin converging lens that has a focal length of 28 cm. If the distance from the image in front of the lens is 24 cm, what is the distance from the object to the lens?
30. A diverging lens has a focal length of 18.0 cm. An insect is placed 7.00 cm in front of the lens. What is the magnification of the image? Describe the image.