9. What is the frequency of an infrared wave that has a vacuum wavelength of 5.5 μm?

A. 165 Hz
B. 5.5×10^{10} Hz
C. 5.5×10^{13} Hz
D. 5.5×10^{16} Hz

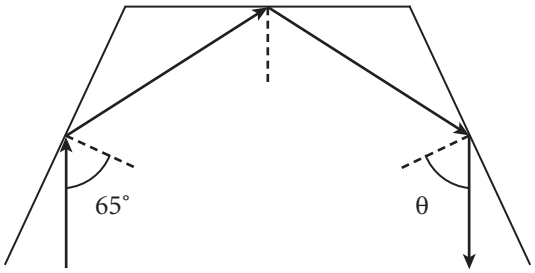
10. If the distance from a light source is increased by a factor of 5, by how many times brighter does the light appear?

F. 25
G. 5
H. 1/5
J. 1/25

SHORT RESPONSE

11. White light is passed through a filter that allows only yellow, green, and blue light to pass through it. This light is then shone on a piece of blue fabric and on a piece of red fabric. Which colors do the two pieces of fabric appear to have under this light?

12. The clothing department of a store has a mirror that consists of three flat mirrors, each arranged so that a person standing before the mirrors can see how an article of clothing looks from the side and back. Suppose a ray from a flashlight is shined on the mirror on the left. If the incident ray makes an angle of 65° with respect to the normal to the mirror's surface, what will be the angle θ of the ray reflected from the mirror on the right?



13. X rays emitted from material around compact massive stars, such as neutron stars or black holes, serve to help locate and identify such objects. What would be the wavelength of the X rays emitted from material around such an object if the X rays have a frequency of 5.0×10^{19} Hz?

EXTENDED RESPONSE

14. Explain how you can use a piece of polarizing plastic to determine if light is linearly polarized.

Use the ray diagram below to answer questions 15–19.

A candle is placed 30.0 cm from the reflecting surface of a concave mirror. The radius of curvature of the mirror is 20.0 cm.

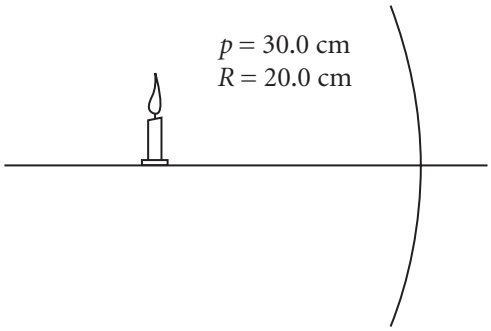
15. What is the distance between the surface of the mirror and the image?

16. What is the focal length of the mirror?

17. What is the magnification of the image?

18. If the candle is 12 cm tall, what is the image height?

19. Is the image real or virtual? Is it upright or inverted?



Test TIP Double-check the signs of all values to be used in the mirror and magnification equations.