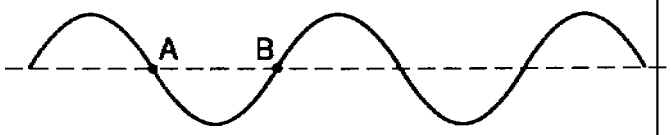
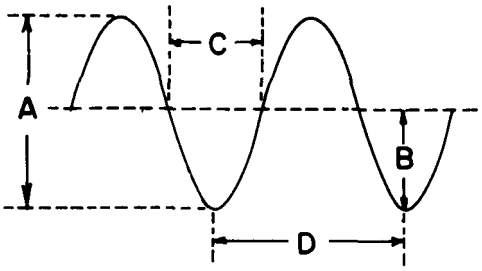
1. In the diagram below, the distance between points *A* and *B* on a wave is 0.10 meter.



This wave must have

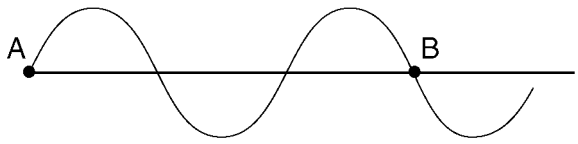
(1) an amplitude of 0.10 m
(2) an amplitude of 0.20 m
(3) a wavelength of 0.10 m
(4) a wavelength of 0.20 m

2. Which distance represents the wavelength of the wave shown below?



(1) *A*
(2) *B*
(3) *C*
(4) *D*

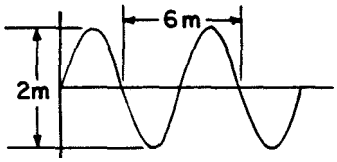
3. The diagram below shows two points, *A* and *B*, on a wave train.



How many wavelengths separate point *A* and point *B*?

(1) 1.0
(2) 1.5
(3) 3.0
(4) 0.75

4. What is the amplitude of the wave represented in the diagram?



(1) 1 m
(2) 2 m
(3) 3 m
(4) 6 m

5. As a longitudinal wave passes through a medium, the particles of the medium move

(1) in circles
(2) in ellipses
(3) parallel to the direction of wave travel
(4) perpendicular to the direction of wave travel

6. Diagram I shows a glass tube containing undisturbed air molecules. Diagram II shows the same glass tube when a wave passes through it.

Diagram I

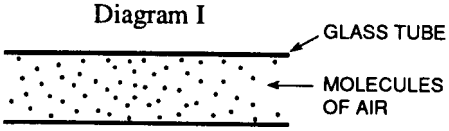
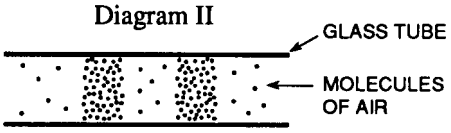


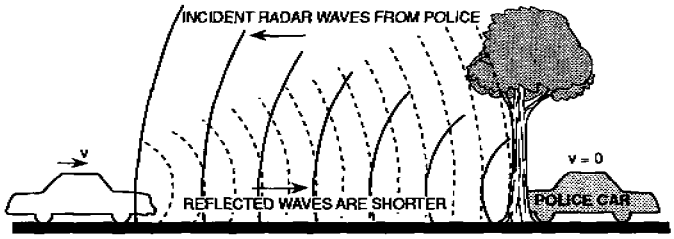
Diagram II



Which type of wave produced the disturbance shown in diagram II?

(1) longitudinal
(2) torsional
(3) transverse
(4) elliptical

7. The diagram below shows radar waves being emitted from a stationary police car and reflected by a moving car back to the police car.



The difference in apparent frequency between the incident and reflected waves is an example of

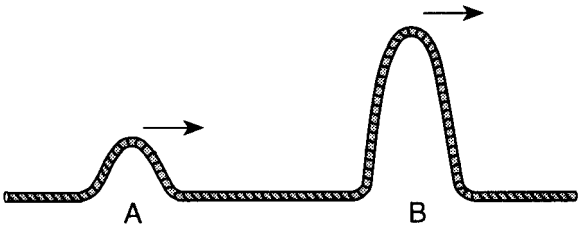
(1) constructive interference (2) refraction (3) the Doppler effect (4) total internal reflection

8. As observed from the Earth, the light from a star is shifted toward lower frequencies. This is an indication that the distance between the Earth and the star is

(1) decreasing (3) constant

(2) increasing

9. The diagram below shows two pulses, *A* and *B* ,moving to the right along a uniform rope.



Compared to pulse *A*, pulse *B* has

(1) a slower speed and more energy

(2) a faster speed and less energy

(3) a faster speed and the same energy

(4) the same speed and more energy

10. The amplitude of a sound wave is to its loudness as the amplitude of a light wave is to its

(1) brightness (3) color

(2) frequency (4) speed

11. For a given frequency of a longitudinal wave, which characteristic is directly related to the energy of the wave?

(1) amplitude (3) wavelength

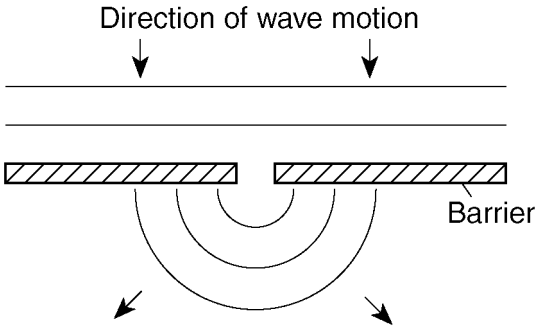
(2) speed of wave (4) period

12. As a sound wave travels through air, there is a net transfer of

(1) energy, only (3) both mass and energy

(2) mass, only (4) neither mass nor energy

13. The diagram below shows wave fronts spreading into the region behind a barrier.

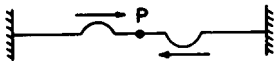


Which wave phenomenon is represented in the diagram?

(1) reflection (3) diffraction

(2) refraction (4) standing waves

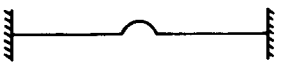
14. Two pulses in a stretched spring approach *P* as shown in the diagram.



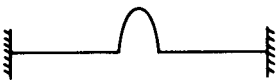
Which diagram best illustrates the appearance of the spring when each pulse meets at *P* ?

(1)

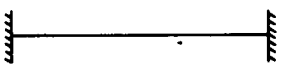
(2)



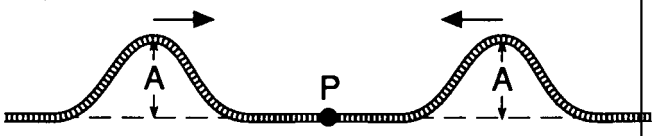
(3)



(4)



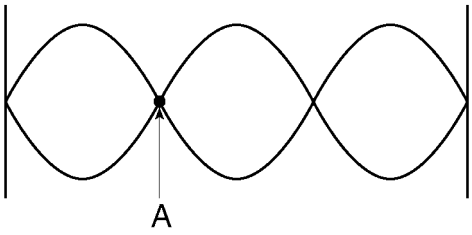
15. The diagram below represents a rope along which two pulses of equal amplitude, *A*, approach point *P*.



When the two pulses meet at *P*, the vertical displacement of the rope at point *P* will be

(1) *A*
(2) 2*A*
(3) 0
(4) *A*/2

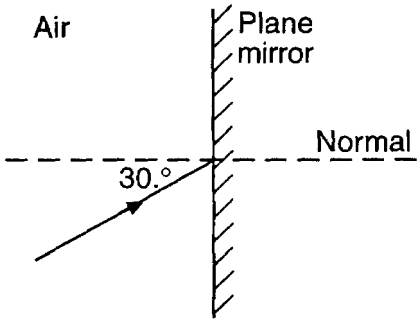
16. The diagram below shows a standing wave.



Point *A* on the standing wave is

(1) a node resulting from constructive interference
(2) a node resulting from destructive interference
(3) an antinode resulting from constructive interference
(4) an antinode resulting from destructive interference

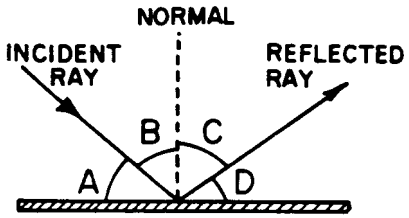
17. A ray of monochromatic light traveling in air is incident on a plane mirror at an angle of 30.°, as shown in the diagram below.



The angle of reflection for the light ray is

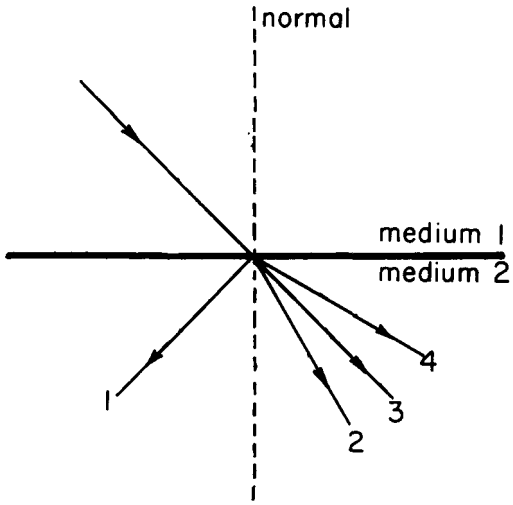
(1) 15°
(2) 30.°
(3) 60.°
(4) 90.°

18. A ray is reflected from a surface as shown in the diagram below. Which letter represents the angle of incidence?



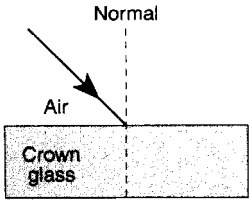
(1) *A*
(2) *B*
(3) *C*
(4) *D*

19. When a light ray passes from medium 1 to medium 2, its speed decreases. Which arrow best represents the path of the ray in medium 2?



(1) 1
(2) 2
(3) 3
(4) 4

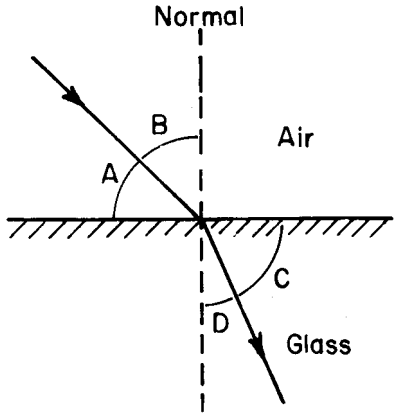
20. The diagram below shows a light ray in air incident on a crown glass block.



As the light ray enters the crown glass block, it will

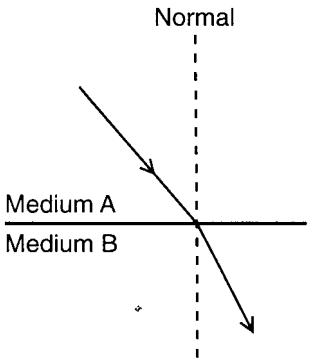
(1) slow down and bend toward the normal
(2) slow down and bend away from the normal
(3) speed up and bend toward the normal
(4) speed up and bend away from the normal

21. The diagram below shows a ray of light being refracted as it passes from air into glass. Which letter represents the angle of refraction for the light ray?



(1) *A*
(2) *B*
(3) *C*
(4) *D*

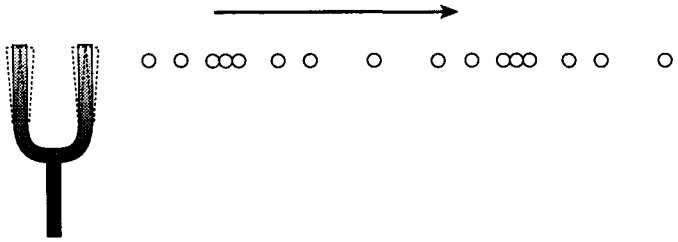
22. The diagram below shows a ray of light passing through two media.



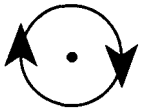
When the wave travels from medium *A* into medium *B,* its speed

(1) decreases
(2) increases
(3) remains the same

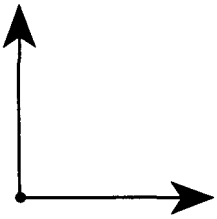
23. The diagram below shows a tuning fork vibrating in air. The dots represent air molecules as the sound wave moves toward the right.

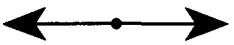


Which diagram best represents the direction of motion of the air molecules?

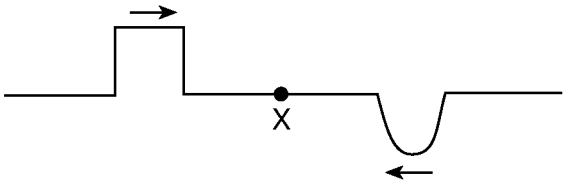
(1)


(3)


(2)


(4)


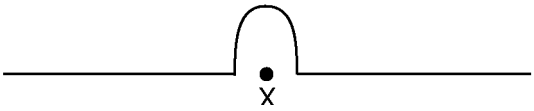
24. The diagram below shows two pulses traveling toward each other in a uniform medium.



Which diagram best represents the medium when the pulses meet at point *X*?

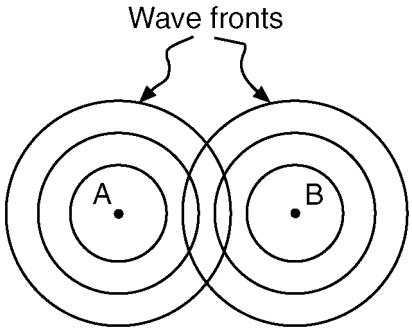
(1)


(2)


(3)


(4)


25. The diagram below represents the wave pattern produced by two sources located at points *A* and *B.*



Which phenomenon occurs at the intersections of the circular wave fronts?

(1) diffraction
(2) interference
(3) refraction
(4) reflection

26. Radiations such as radio, light, and gamma are propagated by the interchange of energy between

(1) magnetic fields, only
(2) electric fields, only
(3) electric and gravitational fields
(4) electric and magnetic fields

27. A photon of which electromagnetic radiation has the most energy?

(1) ultraviolet
(2) x ray
(3) infrared
(4) microwave

28. Compared to the wavelength of red light, the wavelength of yellow light is

(1) shorter
(2) longer
(3) the same

29. Which electromagnetic radiation has the *shortest* wavelength?

(1) infrared
(2) radio
(3) gamma
(4) ultraviolet

30. An astronomical body emitting high-intensity pulses of green light is moving toward Earth at high velocity. To an observer on Earth, this light may appear

(1) red
(2) blue
(3) orange
(4) yellow

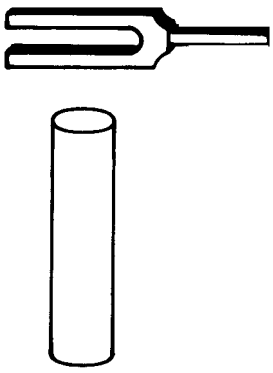
31. Light from the star Betelgeuse displays a Doppler red shift. The shift is best explained by assuming that Betelgeuse is

(1) decreasing in temperature
(2) increasing in temperature
(3) moving toward Earth
(4) moving away from Earth

32. The driver of a car hears the siren of an ambulance which is moving away from her. If the actual frequency of the siren is 2,000 hertz, the frequency heard by the driver may be

(1) 1,900 Hz
(2) 2,000 Hz
(3) 2,100 Hz
(4) 4,000 Hz

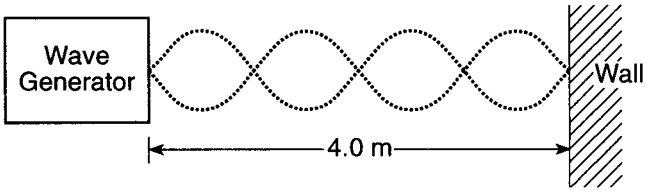
33. Base your answer to the following question on on the diagram and information below. When a vibrating tuning fork is placed over an air column 16 centimeters long and closed on one end, the sound becomes louder.



The wavelength of the sound produced is

(1) 64 cm
(2) 32 cm
(3) 16 cm
(4) 4.0 cm

34. A wave generator located 4.0 meters from a reflecting wall produces a standing wave in a string, as shown in the diagram below.



If the speed of the wave is 10. meters per second, what is its frequency?

(1) 0.40 Hz
(2) 5.0 Hz
(3) 10. Hz
(4) 40. Hz

35. A surfacing whale in an aquarium produces water wave crests having an amplitude of 1.2 meters every 0.40 second. If the water wave travels at 4.5 meters per second, the wavelength of the wave is

(1) 1.8 m
(2) 2.4 m
(3) 3.0 m
(4) 11 m

Crave the Wave 2009 Test

Answer Key

1. 4
2. 4
3. 2
4. 1
5. 3
6. 1
7. 3
8. 2
9. 4
10. 1
11. 1
12. 1
13. 3
14. 4
15. 2
16. 2
17. 2
18. 2
19. 2
20. 1
21. 4
22. 1
23. 4
24. 4
25. 2
26. 4
27. 2
28. 1
29. 3
30. 2
31. 4
32. 1
33. 1
34. 2
35. 1