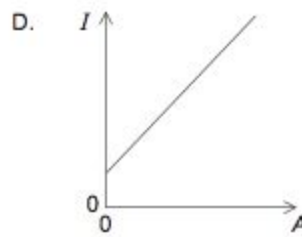
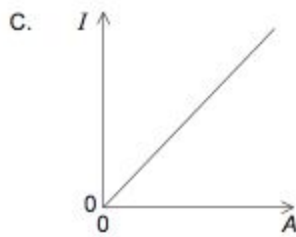
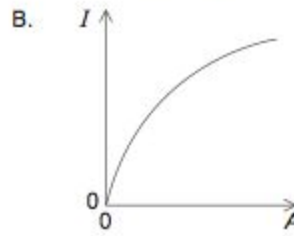
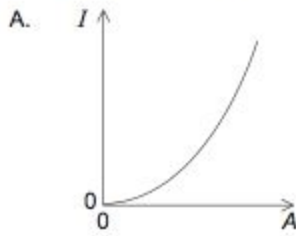
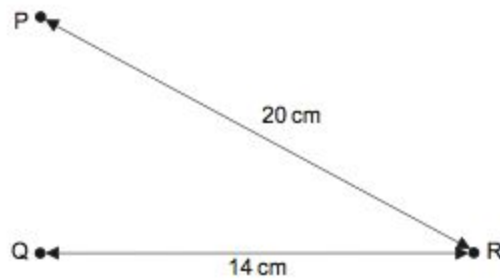


May15

11. Which graph shows the variation with amplitude A of the intensity I for a wave?



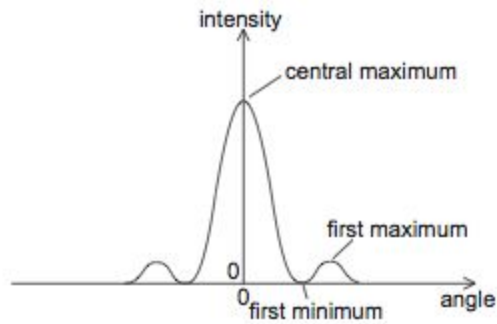
12. Wave generators placed at position P and position Q produce water waves of wavelength 4.0 cm. Each generator, operating alone, produces a wave oscillating with amplitude A at position R. Distances PR and QR are shown in the diagram below.



Both wave generators now operate together in phase. What is the amplitude of the oscillation of the resulting wave at R?

- A. 0
- B. A
- C. A^2
- D. $2A$

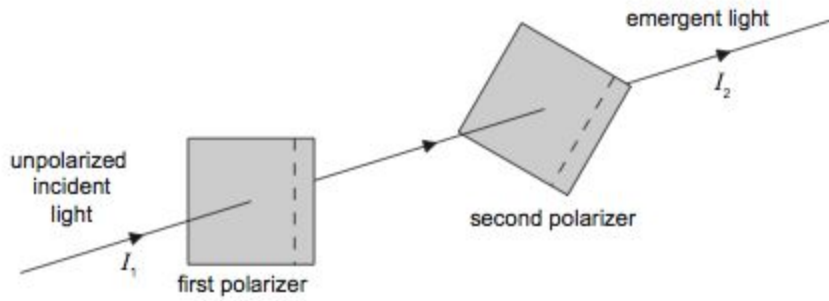
15. The graph below shows the variation of the intensity of light with angle for the diffraction pattern produced when light is diffracted by a slit.



According to the Rayleigh criterion, when the diffraction patterns of two slits are just resolved

- A. the first maximum of one diffraction pattern coincides with the central maximum of the other diffraction pattern.
 - B. the central maximum of one diffraction pattern coincides with the central maximum of the other diffraction pattern.
 - C. the first minimum of one diffraction pattern coincides with the central maximum of the other diffraction pattern.
 - D. the first minimum of one diffraction pattern coincides with the first minimum of the other diffraction pattern.
16. An unpolarized ray of light in air is incident on the surface of water. The reflected ray is completely polarized. Which of the following are separated by an angle of 90° ?
- A. The incident ray and the reflected ray
 - B. The reflected ray and the refracted ray
 - C. The refracted ray and the incident ray
 - D. The refracted ray and the surface of the water

17. Two polarizers have polarizing axes that make an angle of 30° to each other. Unpolarized light of intensity I_1 is incident on the first polarizer so that light of intensity I_2 emerges from the second polarizer, as shown below.



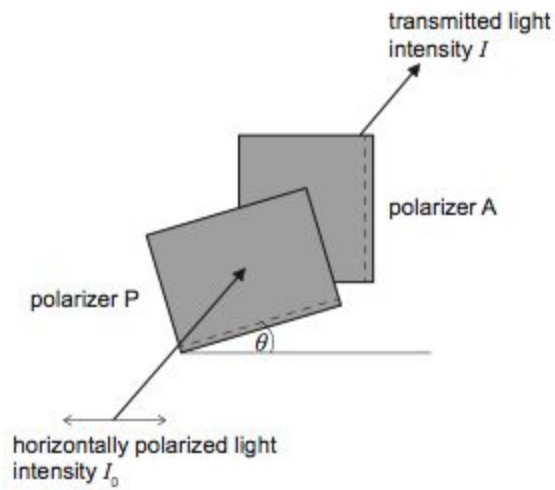
The cosine of 30° is $\frac{\sqrt{3}}{2}$. What is the ratio $\frac{I_1}{I_2}$?

- A. $\frac{3}{8}$
- B. $\frac{4}{3}$
- C. $\frac{4}{\sqrt{3}}$
- D. $\frac{8}{3}$

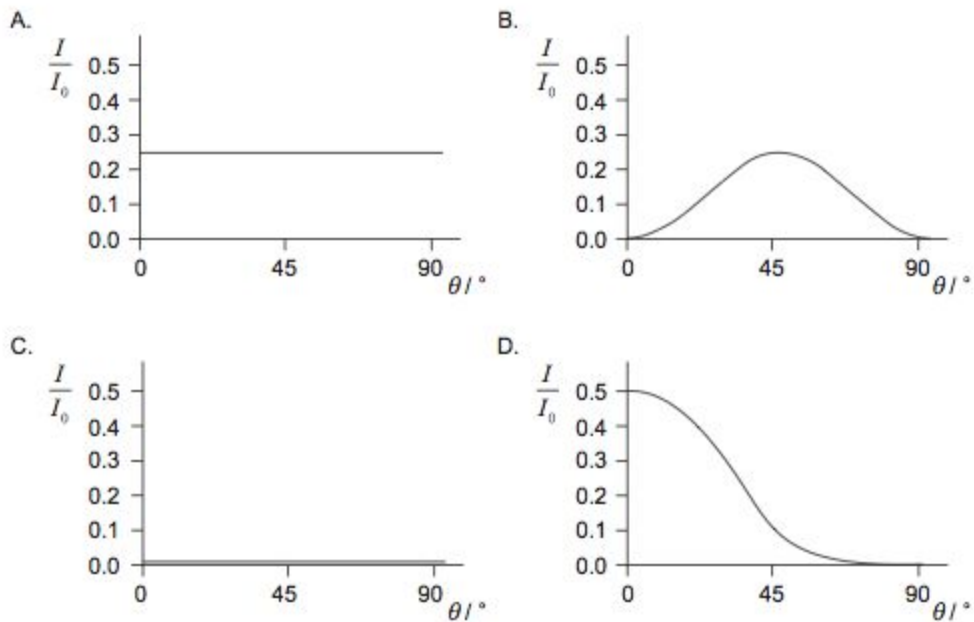
11. A, 12. A, 13. B, 14. A, 15. C, 16. B, 17. D

MAY16

9. Horizontally polarized light of intensity I_0 enters a polarizer P whose polarization axis makes an angle of θ degrees with the horizontal. Light from P is then incident on a polarizer A with fixed vertical polarization axis.



The angle θ is varied from 0 to 90 degrees. Which of the following represents the variation with θ of the intensity I of the light transmitted through A?

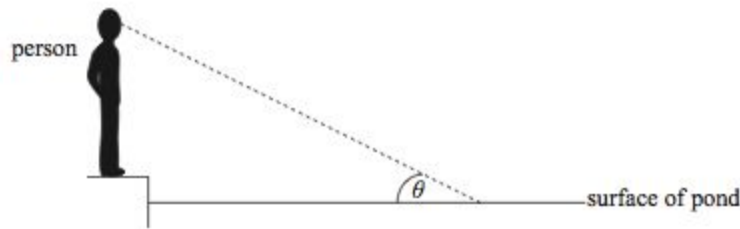


MAY14

18. A parallel beam of coherent light of wavelength λ is incident on a rectangular slit of width d . After passing through the slit the light is incident on a screen a distance D from the slit where D is much greater than d . What is the width of the central maximum of the diffraction pattern as measured on the screen?

- A. $\frac{2D\lambda}{d}$
- B. $\frac{2d}{D\lambda}$
- C. $\frac{D\lambda}{d}$
- D. $\frac{d}{D\lambda}$

19. A person wearing polarizing sunglasses stands at the edge of a pond in bright sunlight.



The surface of the pond is flat and the line of sight of the person makes an angle θ with the surface. The refractive index of the pond water is n . What is the value of θ for which the intensity of the sunlight reflected by the surface to the person's eye is a minimum?

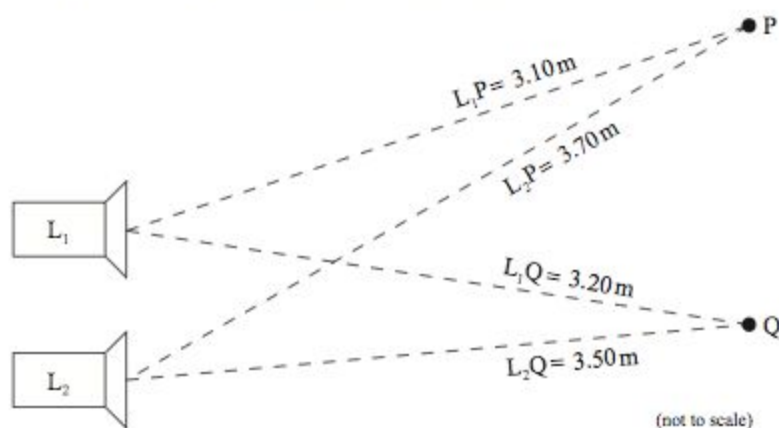
- A. $\tan^{-1}(n)$
- B. $\cos^{-1}\left(\frac{1}{n}\right)$
- C. $\cos^{-1}(n)$
- D. $\tan^{-1}\left(\frac{1}{n}\right)$

18. A

19. D

MAY14

16. Two loudspeakers, L_1 and L_2 , emit identical sound waves.



The waves leaving L_1 and L_2 are in phase and are observed at points P and Q.

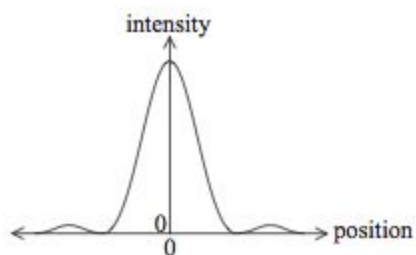
The wavelength of the sound is 0.60 m . The distances of points P and Q from the loudspeakers are shown in the diagram.

Which of the following is true about the intensity of the sound at P and the intensity of the sound at Q?

	Intensity at P	Intensity at Q
A.	maximum	maximum
B.	maximum	minimum
C.	minimum	maximum
D.	minimum	minimum

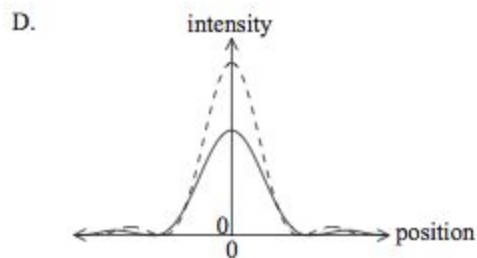
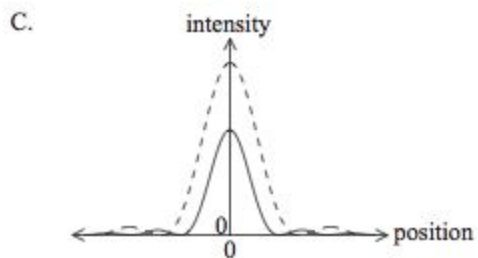
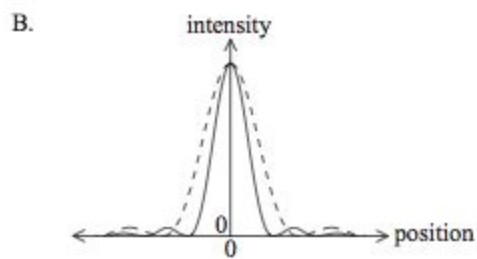
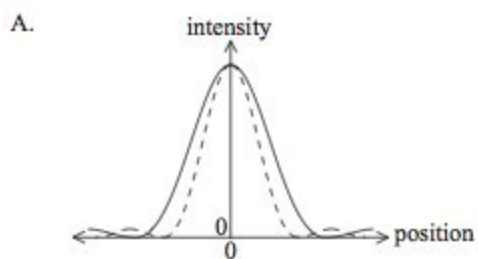
16. B
17. A
18. D
19. A
20. D

18. Monochromatic coherent light is incident on a narrow rectangular slit. The diffracted light is observed on a distant screen. The graph below shows how the intensity of the light varies with position on the screen.

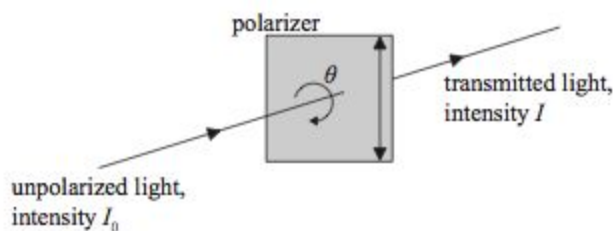


The width of the slit is reduced.

Which graph shows how the intensity of light observed varies with position on the screen? The original diffraction pattern is shown with a dotted line.



20. Unpolarized light of intensity I_0 is incident on a polarizer that has a vertical transmission axis.



The polarizer is rotated by an angle θ about the direction of the incident light. The intensity of the transmitted light is I . Which graph correctly shows the variation with the angle θ of the ratio $\frac{I}{I_0}$?

