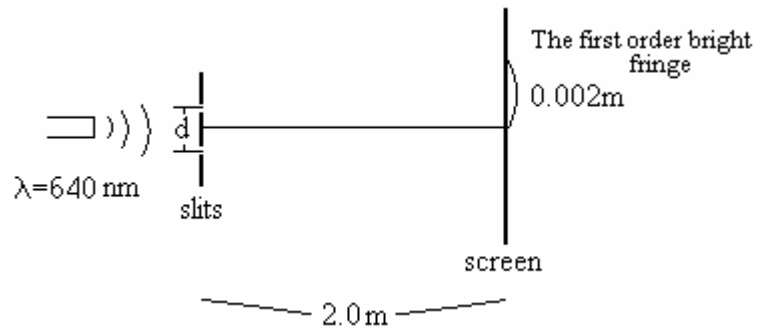


Sample Problems for the Final

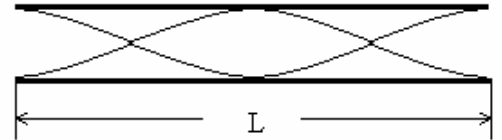
1. From the figure, find the distance between slits.



2. Why a soap bubble is multicolored when viewed in sunlight?
3. You find a dark fringe with a double-slit. The conditions are:
Order $\rightarrow 3$
distance of the slits, $d \rightarrow 4.8 \times 10^{-4} \text{ m}$
Wavelength of the laser $\rightarrow 630 \times 10^{-9} \text{ m}$
Find the Angle (from center to fringe).
4. One calculates the wavelength of light source from a single slit experiment. The variables are:
Order $\rightarrow 1$
Slit width $\rightarrow 4.0 \times 10^{-6} \text{ m}$
Angle $\rightarrow 9.9^\circ$ (from the center of slit to fringe)
Then the person obtains $\lambda = 690 \text{ nm}$. Is the fringe bright or dark?
5. Explain a slit experiment in terms of diffraction and interference.
6. If you want to store energy 3.0 (J) in a capacitor with 10 (V) , what is the capacitance for the minimum?

7. Find the speed of sound in steel, which has the Young's modulus, 2.0×10^{11} (N/m²), and density, 8.0×10^3 (kg/m³).

8. Here is a tube open at both ends. A sound makes the standing waves inside the tube. If the wave length is 1.20 m, what is the length of the tube?



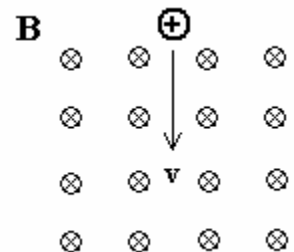
9. Draw the electric field lines for two like and unlike charges.

10. A circuit consumes 30 (W). If current flow of the circuit is 1.2 (A), what is the resistance?

11. Discuss the image properties of a convex and a concave lenses by drawing the ray diagrams.

12. A positive charge, $2.5 \mu\text{C}$, is moving at a constant velocity, 5.0×10^6 m/s. It is about to go into a magnetic field, 1.8 T.

- a. The particle travels 8.4×10^{-6} s before entering the magnetic field. What is the distance does it fly?
- b. Find the magnitude and direction of the Lorentz force in the magnetic field.



13. The peak magnetic field in free space is 2.0×10^{-6} T. What is the rms of the magnetic field?

Answer keys

1. 6.43×10^{-4} m
3. 0.26°
4. Dark
6. 0.06 F
7. 5000 m/s
8. 1.2 m
10. 20.8Ω
12. a. 42 m
b. 22.5 N, right
13. 1.41×10^{-6} T