

Double-Slit Experiment Simulator

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/double-slit-experiment/>

Name: _____ Date: _____

Learning objectives

- Explain interference of waves passing through two slits.
- Relate fringe spacing to wavelength, slit separation, and screen distance.
- Connect the pattern to the wave nature of light.

Variables to change

- Wavelength
- Slit separation
- Screen distance

Procedure

1. Set a mid-range wavelength and note the bright-fringe spacing on the screen.
2. Increase the wavelength and observe how the fringe spacing changes.
3. Increase the slit separation and observe the fringe spacing again.

Observations

Record the bright-fringe spacing as you vary wavelength and slit separation.

Questions

1. What causes the bright and dark fringes?
2. How does increasing the wavelength affect fringe spacing?
3. How does increasing the slit separation affect fringe spacing?

4. Write the condition for bright fringes.
5. What does this experiment demonstrate about the nature of light?

Answer key (instructors)

- **1.** Constructive interference (path difference = whole number of wavelengths) makes bright fringes; destructive interference (half-wavelength differences) makes dark fringes.
- **2.** Fringe spacing increases — spacing is proportional to wavelength.
- **3.** Fringe spacing decreases — spacing is inversely proportional to slit separation.
- **4.** $d \cdot \sin\theta = m\lambda$, where $m = 0, 1, 2, \dots$ and d is the slit separation.
- **5.** That light behaves as a wave; the interference pattern cannot be explained by particles alone.

Light from two slits overlaps and interferes. Where crests meet crests the screen is bright; where crests meet troughs it is dark. Fringe spacing grows with wavelength and shrinks with slit separation, per $d \cdot \sin\theta = m\lambda$ — direct evidence of light's wave nature.