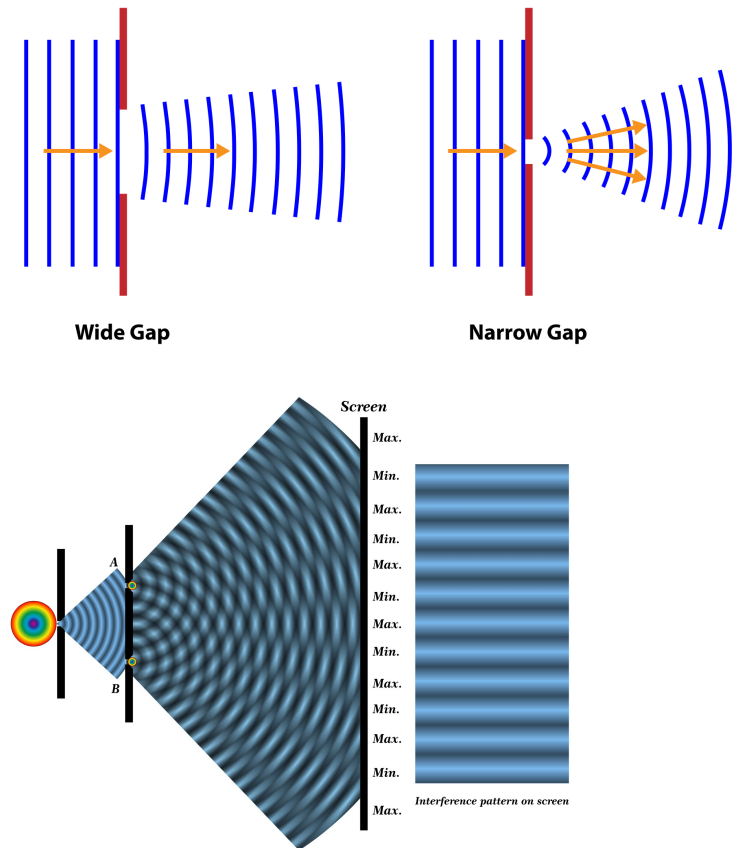


Diffraction and Interference of Waves and the Wave-Particle Duality of Light

Lesson Topics Include:

- Diffraction
- Is light a wave?
- Young's Double Slit Experiment
- Constructive and Destructive Interference
- Maxima and Minima
- Is Light a Wave or Particle?



$$\frac{\Delta X}{L} = \frac{\lambda}{d}$$

Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

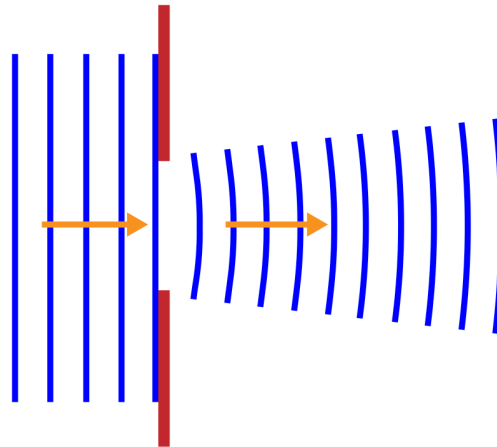
- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

**The paid full version of your resource includes
both Google Slides and PowerPoint and is
Google Classroom Ready**

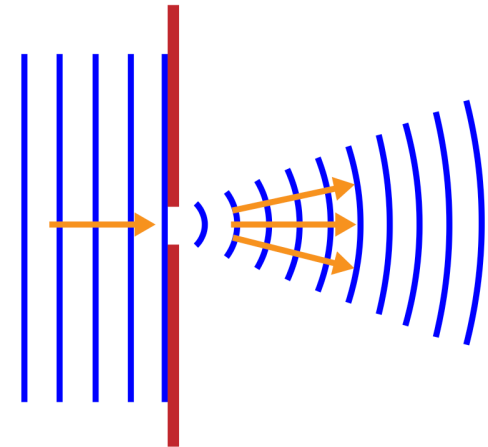


Diffraction Through an Opening

- When a wave passes through an aperture (slit), it radiates out in a circular pattern
- _____
- Longer wavelengths diffract more than shorter ones



Wide Gap



Narrow Gap

Is Light a Wave?

If light is a wave, then it should also diffract through a small opening like other waves.



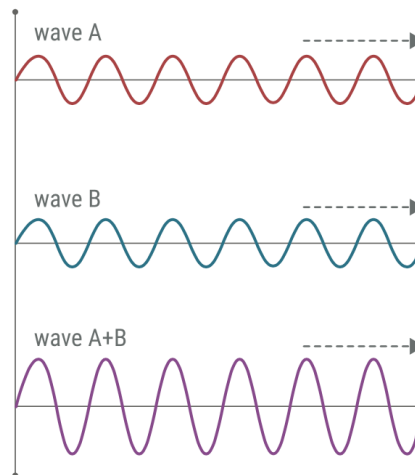
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Removed**

Constructive and Destructive Interference

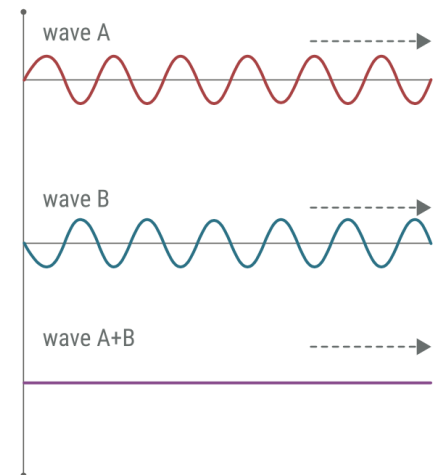
- Constructive interference occurs when waves build each other up, producing a resultant wave of greater amplitude than the given waves

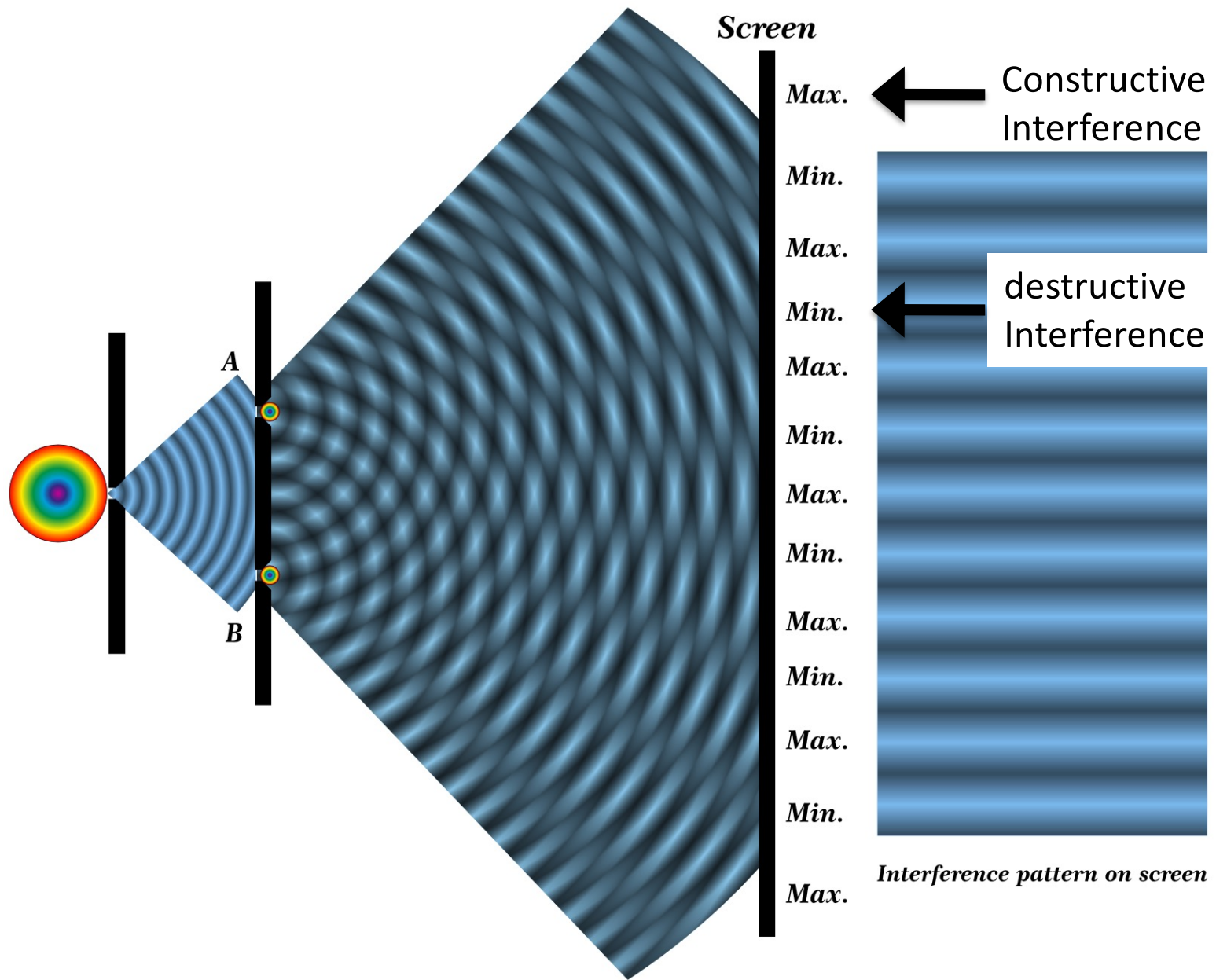
- _____

constructive interference



destructive interference





- _____
- _____

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We can also look at things mathematically

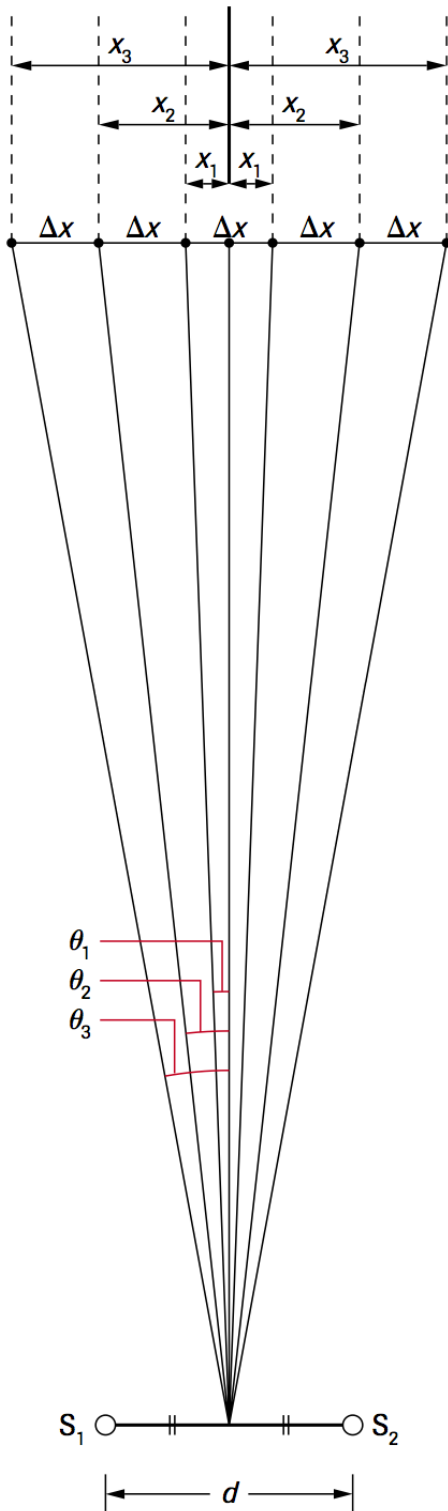
$$\frac{\Delta X}{L} = \frac{\lambda}{d}$$

X = distance between bright or dark bands

L = distance from sources to screen

λ = wavelength of wave coming from sources

d = distance between sources



Check Your Understanding

You are measuring the wavelength of light from a certain single-colour source. You direct the light through two slits with a separation of 0.15 mm, and an interference pattern is created on a screen 3.0 m away. You find the distance between the first and the eighth consecutive dark lines to be 8.0 cm. At what wavelength is your source radiating in nm?

$$\frac{\Delta X}{L} = \frac{\lambda}{d}$$

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Wave-Particle Duality

- When light is shown through narrow slits (double slit experiment), it behaves like a wave
- When we shine light on a metal and examine the spray of electrons, it behaves like a particle
- _____