Waves Interference Remote Lab Interference I / 64

(This lesson is designed for a student working remotely.)

https://phet.colorado.edu/sims/html/wave-interference/latest/wave-interference_en.html

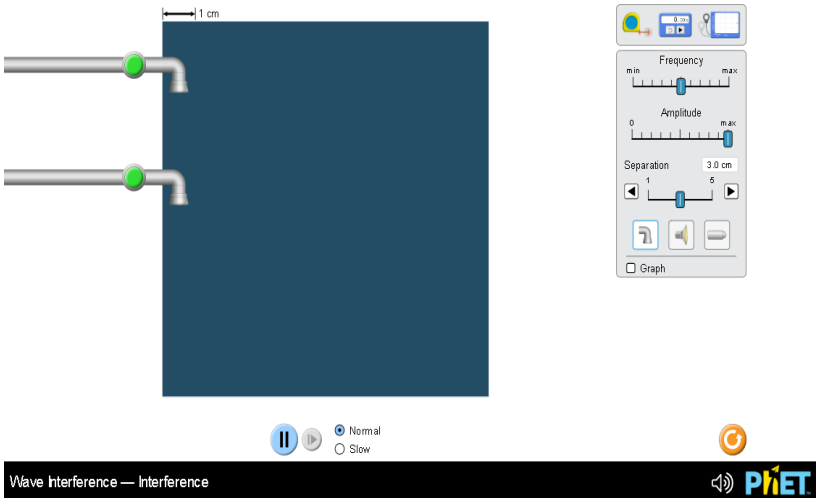
Learning Goals: Students will be able to:

A. Create an interference pattern with two sources, and determine the ways to change the pattern.
B. Find points of constructive and destructive interference by eye and by using the detectors.
C. Put up a slit barrier to see how the waves move through one or two slits.

a. What sort of pattern do the slits create? (2 pts)

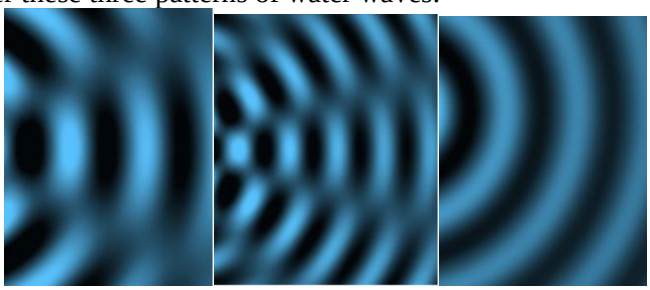
b. How can you change this pattern? (2 pts)

Develop your understanding: Open the **Interference** screen, then explore to make water waves with varying patterns.



Explain your understanding:

1. Consider these three patterns of water waves:



A B C

   a. Describe the similarities and differences of the three patterns of water waves. (2 pts)

   b. Experiment to make similar patterns, then explain how you can use the simulation to make each. (2 pts)

   c. Why do the directions say "similar patterns"? (2 pts)

2. Experiment to make waves of different interference patterns with <u>water, sound, and light.</u> Use your own words and captured images (screen shot: right bottom three dots) from the simulation to show you can meet learning goal A: "Create an interference pattern with two sources, and determine the ways to change the pattern." Capture three different interference patterns and explain each below the captured image. (4 pts)

3. Use the Water Level tank:  tool to understand what is happening in the water

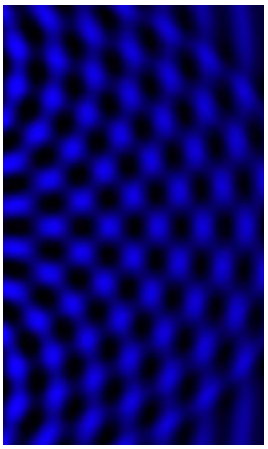
   a. Measure the dark and light areas of waves made with only <u>one</u> faucet. Insert a screen image to help explain your answer. (4 pts)

   b. Make waves using both faucets and measure the dark, light and fuzzy spots. Insert a screen image to help explain your answer. (4 pts)

   c. What do you think constructive and destructive interference means based on your measurements? (4 pts)

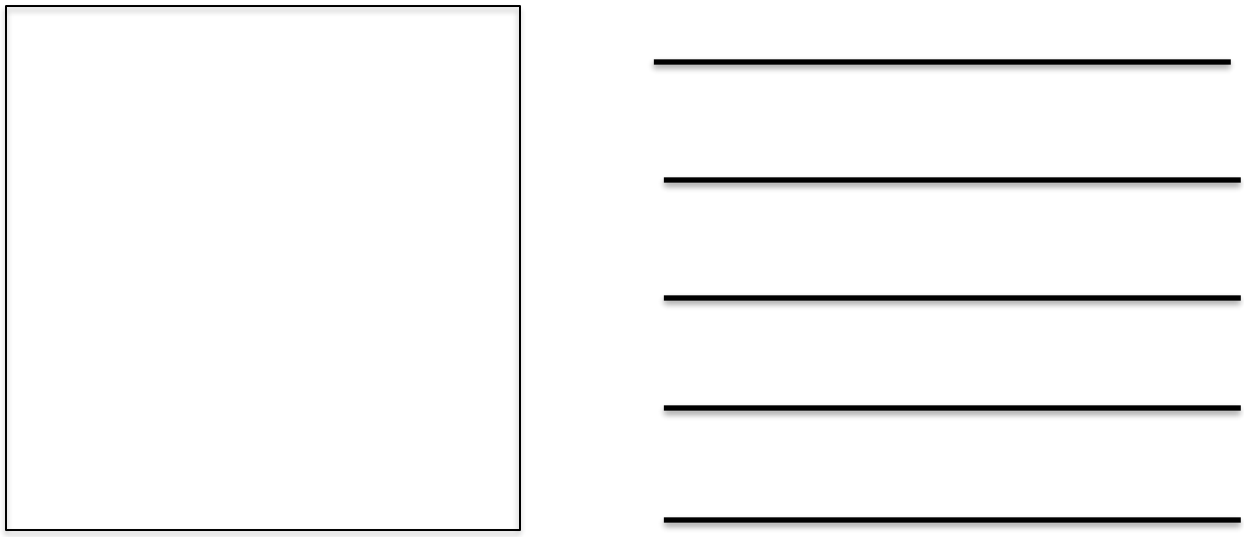
   d. Verify your understanding using your textbook (cite the page number) or site another source with reference to its webpage or source. (4 pts)

4. Consider the light pattern on the right:

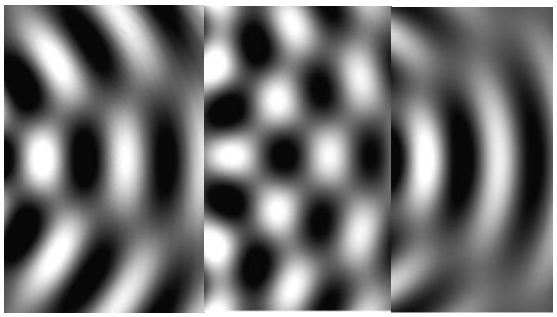


a. Describe where the points of constructive and destructive interference are in the image on the right. (2 pts)

b. Create a similar wave pattern and use the detectors to find points of constructive and destructive interference. Take a screen shot and show below. Describe or illustrate points of constructive and destructive interference. (4 pts)



5. These three patterns were made with sound waves by varying only one thing.



A B C

a. What do you think was varied? (2 pts)

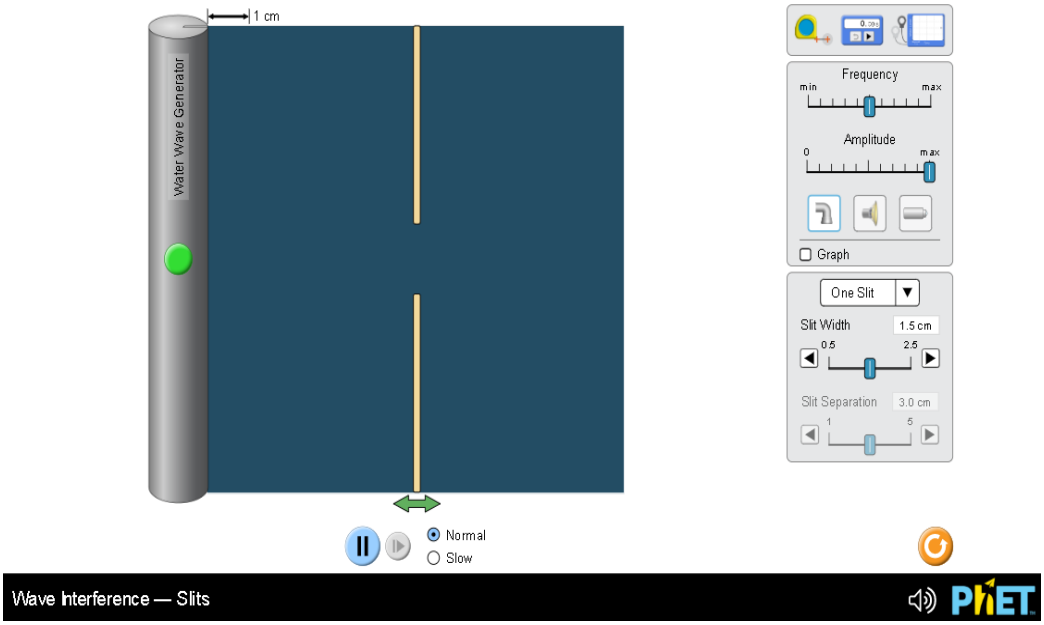
b. Test your idea by making similar patterns. What did you do? (2 pts)

c. Is there more than one way to make these three patterns by varying only one thing? Test your ideas and provide evidence for support. Screen shot or description(s). (4 pts)

d. Try to make similar patterns with light. Describe your observations and ideas.(4 pts)

6. Summarize key ideas of interference patterns of water, sound and light waves. (4 pts)

Develop your understanding: Open the **Slits** screen, then explore to make water waves with varying patterns.



Explain your understanding:

7. How do waves made by a dripping faucet compare to the waves seen passing through slits? You may want to have both **Interference** and **Slits** open (or open the full simulation **Waves Interference**), so that you can easily compare the waves and their patterns. (4 pts)

8. Do the same concepts apply when you compare the sound and light waves in **Interference** and **Slits** screens? (4 pts)

9. Summarize your understanding of waves as they pass through slits. Make sure you demonstrate meeting learning goal C "Put up a Slit barrier to see how the waves move through one or two slits."

a. What sort of pattern do the slits create? (2pts)

b. How can you change this pattern? (2 pts)