Name: ___________________________

Date: ___________________________

pHet Light Waves Activity

SPH4U

Go to: http://phet.colorado.edu/en/simulation/wave-interference and click on "Run Now!"

Part 1: Water Waves Analogy

Observe the waves waves created by the drips from the faucet. The brighter areas indicate positive displacement from equilibrium and the darker areas indicate negative displacement. (You can check this yourself by clicking on "Add Detector." Note that the detector has a moveable probe and that you can pause the simulation.)

What happens to the appearance of the waves if you increase the amplitude of the waves?

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What happens to the appearance of the waves if you increase the frequency of the waves?

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Explain why: ____

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Click on "Two Drips." What happens? ____

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Explain why: ____

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Increase the spacing between the dripping faucets. What changes?

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Click on "One Drip" again. Click on "Two Slits." What happens on the *far* side of the slits?

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Explain why: ____

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Increase the spacing between the slits. What changes?

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Click on "One Slit." What happens? (And is there any interference on the far side of the slit?)

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Decrease the slit width. What changes?

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Part 2: The Interference of Light

Click on the "Light" tab at the top of the simulation.

Change the wavelength of the light from red to blue. How does the appearance of the wave change?

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Click on "Show Screen." Click "Two Lights." Describe the resulting pattern on the screen.
(You may want to click on "Intensity Graph.")

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Explain the "why" behind this pattern: ____

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Increase the amplitude of the light. How does the pattern on the screen change?

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Increase the spacing between the lights. How does the pattern on the screen change?

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Change the wavelength of the light back to red. How does the pattern on the screen change?
(Note that *more* than just the colour changes.)

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Part 3: The Diffraction of Light

Click on “One Light” and on “One Slit.” Move the barrier to the centre of the simulation.

Describe the resulting pattern on the screen. (You may want to click on “Intensity Graph.” You may also want to set the amplitude to maximum.)

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Change the wavelength of the light to blue. What changes?

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Double the slit width. What changes?

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Reset the slit width and select “Two Slits.” How is the two-slit inference pattern different from the two-source interference pattern? (You may want to take a look at the two-source interference pattern again.)

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Extend Your Thinking

This simulation uses monochromatic (single-colour) light. What do you think would happen if you used white light instead of monochromatic light? Explain why. Refer to your results above. You may wish to use a diagram.

We will return to this idea next week when we talk about Diffraction and Spectroscopes/Spectrometers.