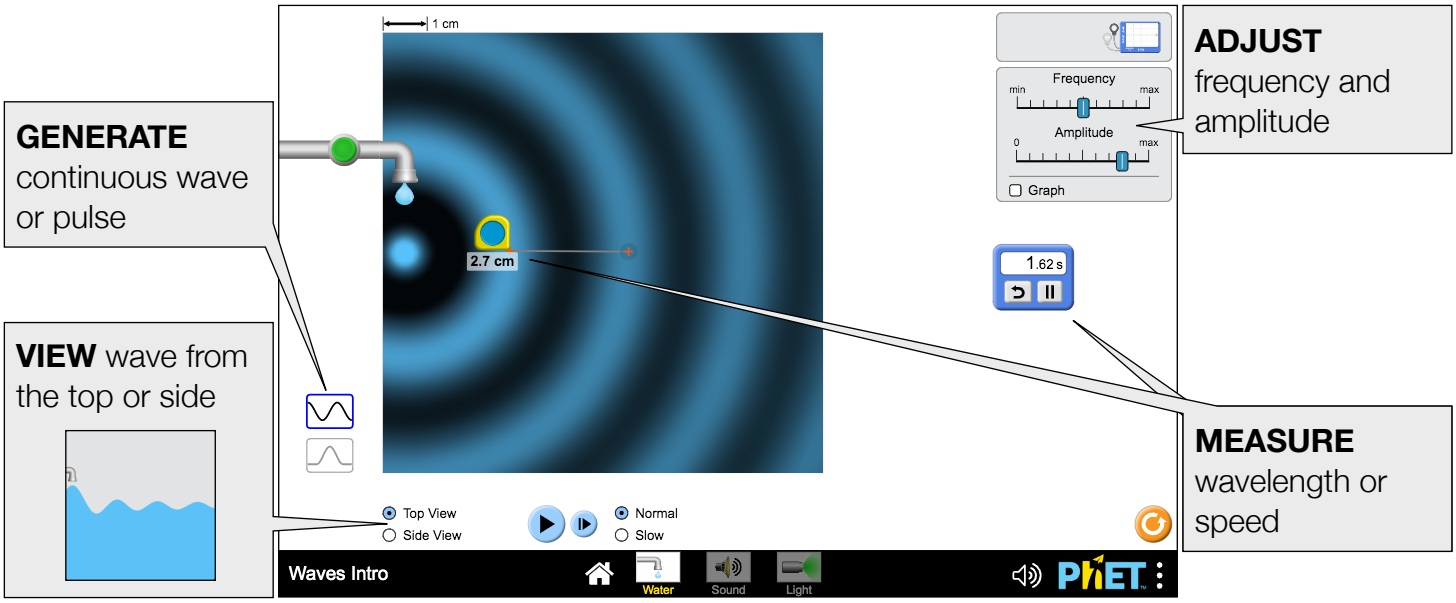
PhET Tips for Teachers

Waves Intro

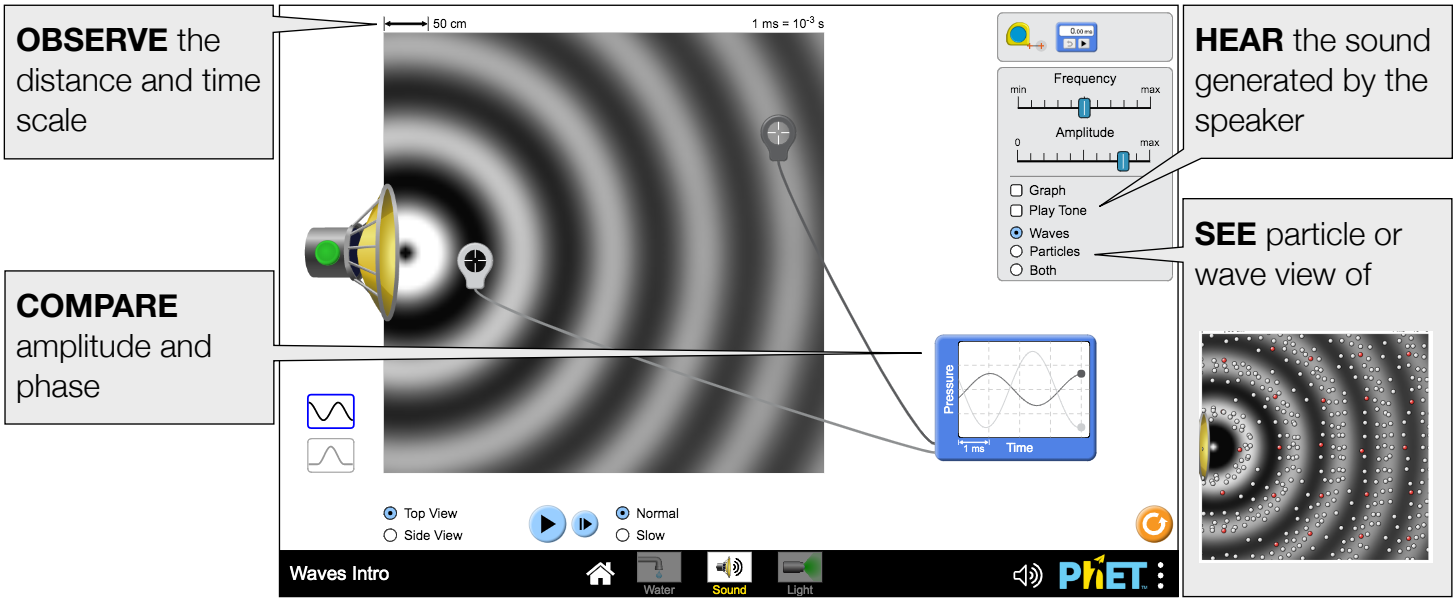
Water Screen

Make waves with a dripping faucet. Adjust frequency and amplitude, and observe the effects.



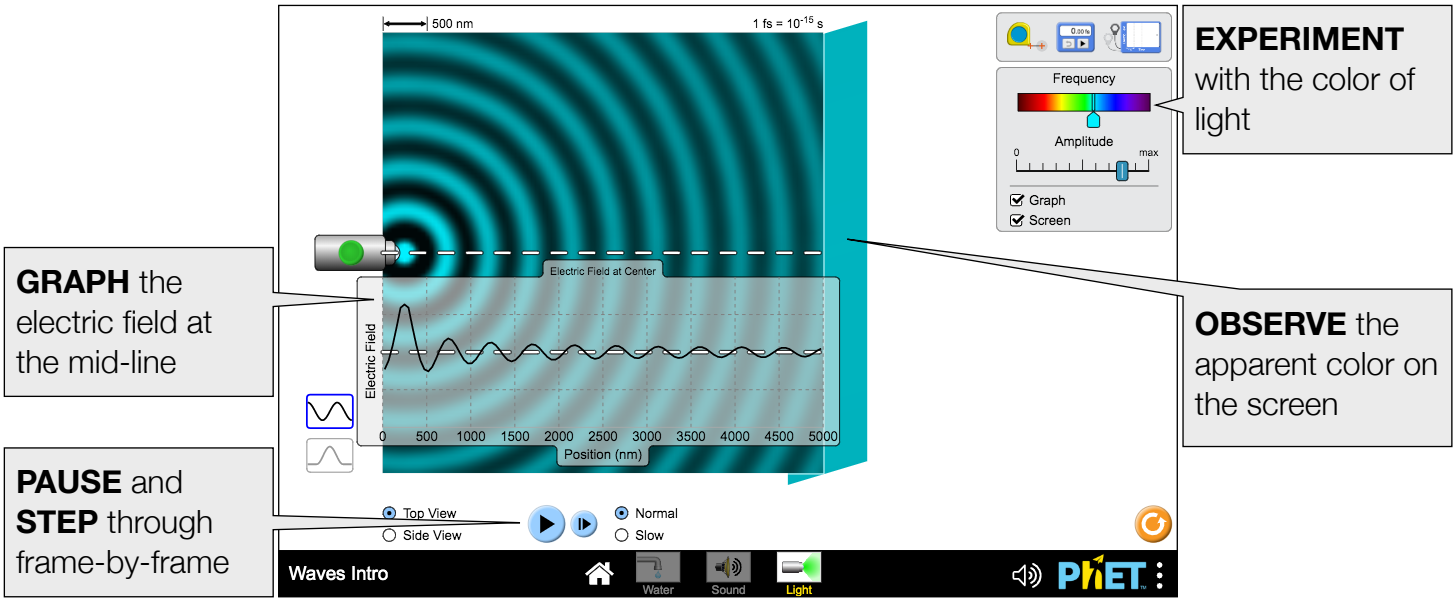
Sound Screen

Use a speaker to create a sound wave. Observe the sound wave as particles, waves, or both.



Light Screen

Experiment with a laser and discover what determines the color of light.



Model Simplifications

- The color of the wave maps to its amplitude (fully saturated color = peak at max amplitude; fully saturated black = trough at max amplitude). The color-mapping is piecewise defined. Amplitudes greater than zero linearly map to color values of 40%-100%, while amplitudes less than zero linearly map to color values of 0%-40%. This was done to improve the appearance of the nodes in the Wave Interference sim, while maintaining balance between the apparent widths of the maxima and minima,
- Before the laser is turned on, the wave viewing window is black, suggesting that the light propagates into vacuum. However, when the laser is running, black represents a trough.
- Due to the different time scales across the water, sound, and light screens, the next frame button will advance time by a different amount in each screen.
- The boundaries of the wave viewing window are absorbing, but there are still some artifacts due to internal reflections. This can result in some noise in the Screen.
- The particle view of sound can only support one frequency at a time. Changing the frequency will lead to temporary misalignment between the particles and the wavefronts at the previous frequency.

Suggestions for Use

Sample Challenge Prompts

- Compare water, sound, and light waves. What similarities and differences do you notice?
- How does changing the frequency and amplitude affect the characteristics of the wave? How are the water droplet and speaker affected?
- Design an experiment to measure the speed of the wave. How does your measurement compare to the accepted value of the speed of sound or light? How can you explain the discrepancies between your calculated value and the accepted value?

See all published activities for Wave Intro here.
For more tips on using PhET sims with your students, see Tips for Using PhET.

Rouinfar, September 2019