

THE STANDARD

Waves & Energy

Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.



PS4.A · Wave Properties

A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.

A wave is a repeating pattern. Three numbers describe it. Wavelength is the distance from one crest to the next. Frequency is how many waves pass a point each second. Amplitude is the height from the rest line up to the crest. Of those three, amplitude is the one tied to energy. **Bigger amplitude means more energy carried by the wave.**



Using Mathematics and Computational Thinking

Use mathematical representations to describe and/or support scientific conclusions and design solutions.

Students aren't just watching waves. They're measuring them, plotting them, and using simple math to connect numbers to behavior. A labeled diagram, a wavelength-vs-frequency ratio, a quick plot of amplitude against energy. **The math is the lens that turns "the wave got bigger" into "the amplitude doubled, so the energy went up."**



Patterns

Graphs and charts can be used to identify patterns in data.

Waves are patterns by definition. Every wave repeats. Once students start sketching and graphing them, the same shape shows up in a slinky, a rope, a sound wave, and a water ripple. Recognizing that shared pattern is the whole point. **Different sources, same math.**