THE STANDARD

Wave Properties & 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.

DCI
DISCIPLINARY CORE IDEA

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.**

SEP
SCIENCE & ENGINEERING PRACTICE

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."**

CCC
CROSSCUTTING CONCEPT

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.**