THE STANDARD

Modeling Waves

"Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move."

ANCHORING PHENOMENON

The Rope That Won't Travel

Tie one end of a long rope to a chair. Shake the other end up and down, and a wave races to the chair. But here is the puzzle: the rope never goes anywhere. Each part bounces in place, yet the wave clearly moves. 4th graders want to know how that works.

> **DRIVING QUESTION**
>
> *"How can a wave move all the way down the rope when the rope itself never moves to the other side?"*

INVESTIGATIVE 1

Ripples in the Water Tray

Tap one finger on a shallow tray of water and watch the ripples spread in rings. Drop a small cork on the water first. When the ripple reaches it, the cork bobs up and down but stays put. The wave moves, the water does not travel with it.

> **DRIVING QUESTION**
>
> *"When the ripple passes the floating cork, why does the cork bob in place instead of riding the wave away?"*

INVESTIGATIVE 2

Big Shake, Little Shake

Stretch a coiled spring toy or a jump rope flat on the floor between two people. Shake your end gently, then shake it big. The gentle shake makes short bumps, the big shake makes tall bumps. Now shake slow versus fast and watch the spacing change. This one zeroes in on two words: amplitude and wavelength.

> **DRIVING QUESTION**
>
> *"What do I have to change about my shaking to make the wave taller, and what makes the bumps crowd closer together?"*