Ripples in Motion

Read wave patterns, then build a model.

4.5 "Develop and use models to describe amplitude and wavelength patterns and how waves can cause objects to move."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the words that tell how high the crests rise, circle the words that tell how far apart the crests are, and draw a small arrow beside each detail about the leaf's motion. Use your marks to compare the wave patterns.

Mina's Pond Test

1. At a pond, Mina gently dips one end of a long, thin board into the water and lifts it again. Curved ripples spread away from the board. Each ripple has a high part called a crest. The space from one crest to the next is the wavelength. Mina watches a leaf floating beyond the board. A wave reaches the leaf, and it bobs up and down.

2. Mina tries two sets of ripples. First, she moves the board only a little. The crests rise a small distance above the water's resting level. Next, she moves the board farther up and down. The crests rise higher, and the leaf bobs farther up and down when the waves reach it. Amplitude is the height from the resting level to a crest, not the space between crests.

3. Next, Mina moves the board up and down more often, but keeps each move about the same size. As the ripples spread at about the same speed, the crests are closer together. Their wavelength is shorter, but their amplitude stays about the same. Mina sketches the two patterns using the same scale so she can compare the space between crests. Her sketch also shows arrows beside the leaf to model its up-and-down motion.

2 ANSWER WITH EVIDENCE

Use the passage

1. How would you show the change in amplitude between Mina's first and second sets of ripples?

2. When Mina moves the board more often, how should the space between crests change in her sketch? What does that show?

3. In Mina's last test, which wave measure stays about the same? What does she do to help keep it that way?

4. In a model of Mina's second set of ripples, which way should arrows beside the leaf point? How should their lengths compare with arrows for the first set?

3 YOUR TURN

Your own words

Draw two side-by-side models of waves moving along a rope with a bead tied near its middle. Make the second model have taller crests and more space between crests than the first, label amplitude and wavelength in both models, and use arrows to show the bead's motion. Write one sentence explaining how the bead's motion changes.

ANSWER KEY

Ripples in Motion

GRADE 4 · 4.5

PART 1 · READ AND MARK

Underline the words that tell how high the crests rise, circle the words that tell how far apart the crests are, and draw a small arrow beside each detail about the leaf's motion. Use your marks to compare the wave patterns. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How would you show the change in amplitude between Mina's first and second sets of ripples?	**Draw the second set with crests higher above the resting level because Mina moves the board farther up and down.**
2	When Mina moves the board more often, how should the space between crests change in her sketch? What does that show?	**Draw the crests closer together. This shows a shorter wavelength.**
3	In Mina's last test, which wave measure stays about the same? What does she do to help keep it that way?	**Amplitude stays about the same because Mina keeps each board movement about the same size.**
4	In a model of Mina's second set of ripples, which way should arrows beside the leaf point? How should their lengths compare with arrows for the first set?	**The arrows should point up and down. They should be longer for the second set because the leaf bobs farther.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: Low crests close together, a short vertical line from the resting level to a crest labeled amplitude, a short horizontal line from crest to crest labeled wavelength, and short up and down arrows beside the bead. Panel 2: Taller crests farther apart, a longer amplitude line, a longer wavelength line, and longer up and down arrows beside the bead. The bead moves farther up and down as the taller waves pass.

Accept models that measure amplitude from the resting level to a crest and wavelength from one crest to the next. The bead should move up and down, with greater motion in the second model.