WAVES, SOUND & PHYSICAL OPTICS DAY 1: WAVE PULSES AND PROPERTIES

CED 14.1 · Skill 1.B · FRQ: TBR

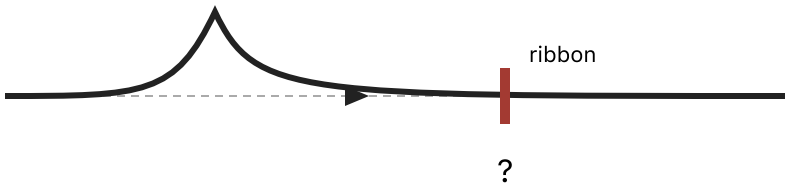
PREDICT

A pulse travels toward a ribbon tied to one point on a rope. What will the ribbon do?

A. travel with the pulse **B. move up and down, then return** **C. move steadily right** **D. remain still**

Commit to one choice and be ready to identify what you tracked.

PULSE APPROACHING A MARKED POINT



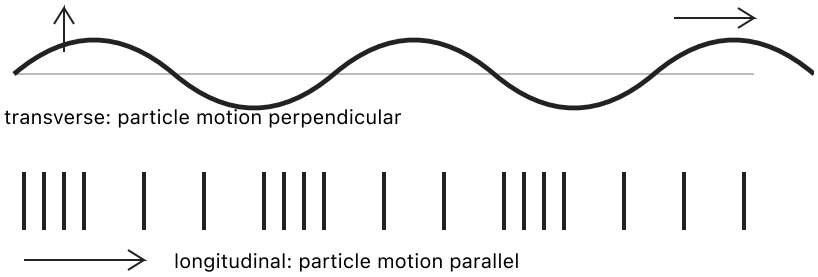
WHAT A WAVE TRANSPORTS

A mechanical wave is a traveling disturbance in a medium. It transfers **energy** from place to place. Individual pieces of the medium oscillate near their equilibrium positions rather than traveling with the disturbance.

NOTES / REASONING

TWO DIRECTIONS TO COMPARE

MEDIUM MOTION COMPARED WITH WAVE TRAVEL



Transverse

The medium moves perpendicular to the wave's travel. A wave on a stretched rope is an example.

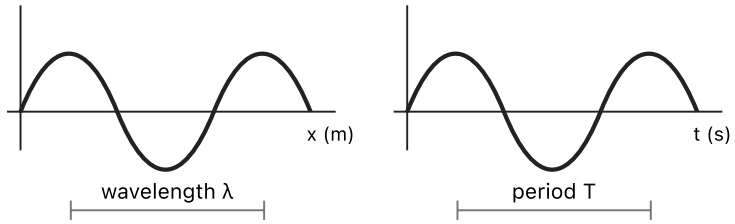
Longitudinal

The medium moves parallel to the wave's travel. Sound in air is an example.

Classify and justify: A line of coils compresses left and right while the compression travels right. Is the wave transverse or longitudinal?

READING A WAVE

SNAPSHOT AND HISTORY ARE DIFFERENT MEASUREMENTS



snapshot: many positions, one time

history: one position, many times

Quantity	Meaning	Read from
amplitude A	maximum displacement from equilibrium	vertical axis of either graph
wavelength λ	distance between repeating in-phase points	snapshot: y vs x
period T	time for one cycle	history: y vs t
frequency f	cycles each second	$f = 1/T$

A wave has $A = 4.0\,\text{cm}$, $\lambda = 1.20\,\text{m}$, and $T = 0.400\,\text{s}$. Find f.

CHECK YOUR MODEL

1. A pulse travels $3.60\,\text{m}$ in $1.50\,\text{s}$. Find its speed and carry units through the calculation.

2. On a y-versus-x snapshot, two adjacent crests are $0.90\,\text{m}$ apart. What quantity has been measured?

3. On a y-versus-t history, crests are $0.250\,\text{s}$ apart. Find the frequency.

4. A cork bobs as water ripples pass. Explain why this is evidence against the claim that water travels outward with each crest.