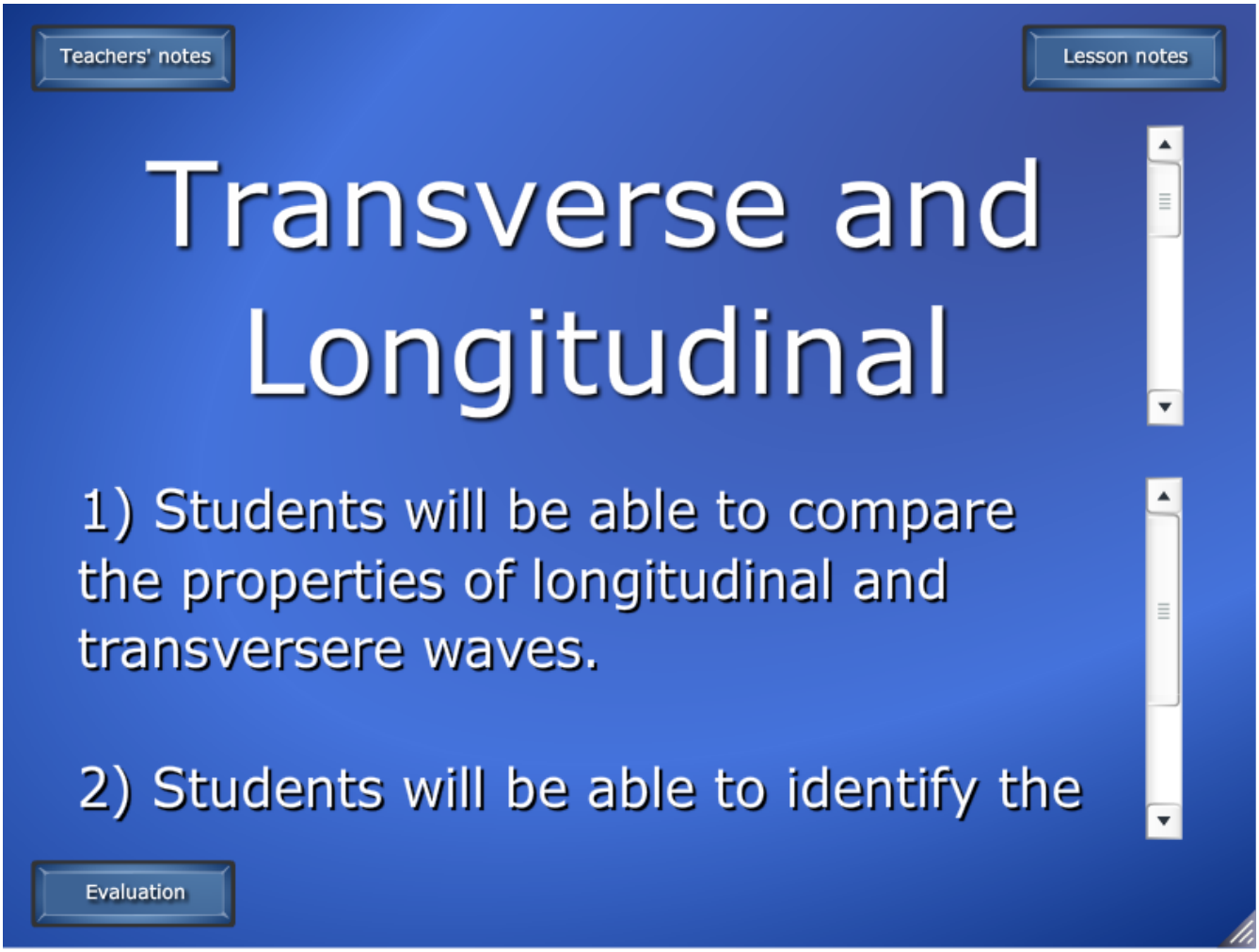
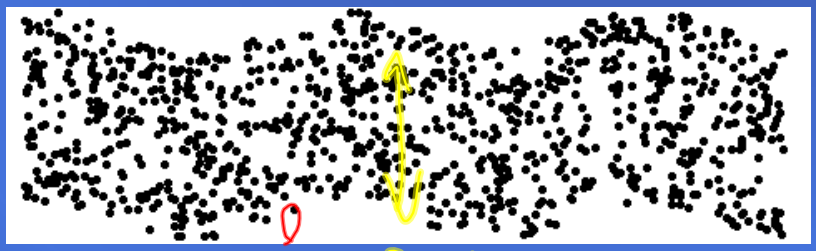

Teachers' notes
Lesson notes
Transverse and Longitudinal
1) Students will be able to compare the properties of longitudinal and transversere waves.
2) Students will be able to identify the
Evaluation

Transverse vs. Longitudinal Waves

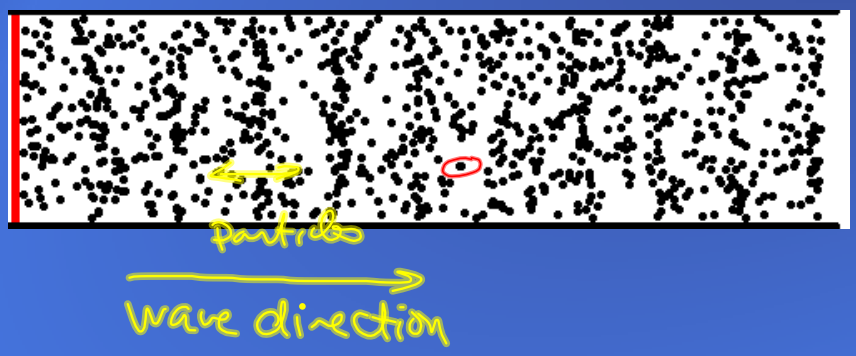
In a transverse wave, the particles in the medium exhibit SHM in a plane perpendicular to the direction of the wave's motion.

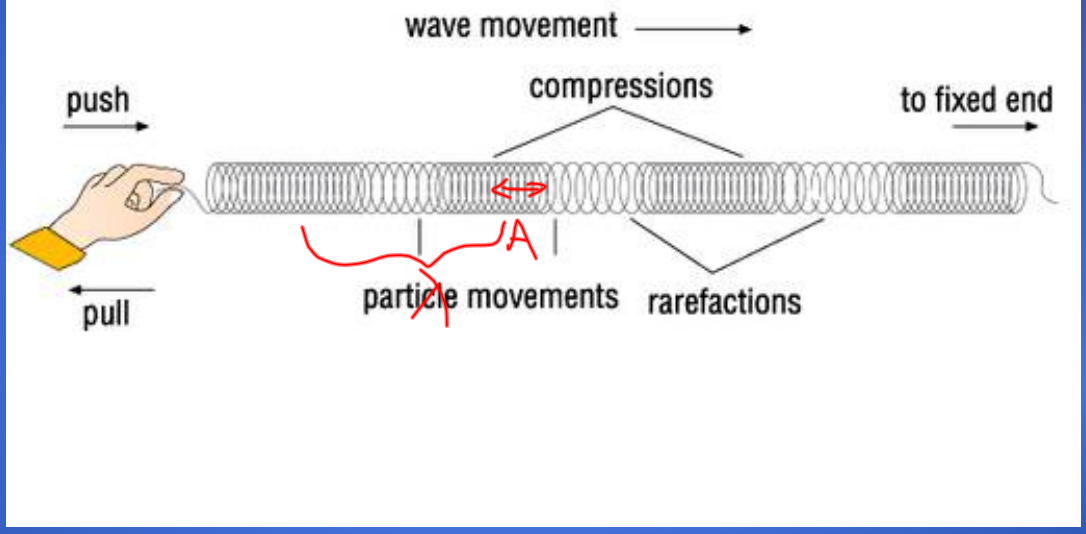
wave direction



Particle

In a longitudinal wave, the particles in the medium move in a direction parallel to the direction of the wave. Sound is an example of a longitudinal wave.




wave movement
compressions
push
to fixed end
pull
particle movements
rarefactions

Use a slinky to answer the following questions:

1. What determines the amplitude of a pulse?

- orig disturbance (hand motion)

2. Does the amplitude effect the speed of a pulse?

speed & amp are unrelated

3. How does the motion of one loop of slinky compare to the motion of the pulse for a transverse wave? Longitudinal?

transverse - ⊥ Longitudinal - //

4. What effect does stretching the slinky more/less have on the speed of the wave?

tight spring - fast loose spring - slow

5. What is the orientation of the pulse after it has reflected off one end of the slinky?

A wave pulse can do two things when it reaches a new medium. It can be:

1. ...transmitted into the new medium. The orientation of the wave will be the same, but the speed, amplitude and wavelength will change.

fast → slow
- v slows down
- A ?
- λ gets smaller

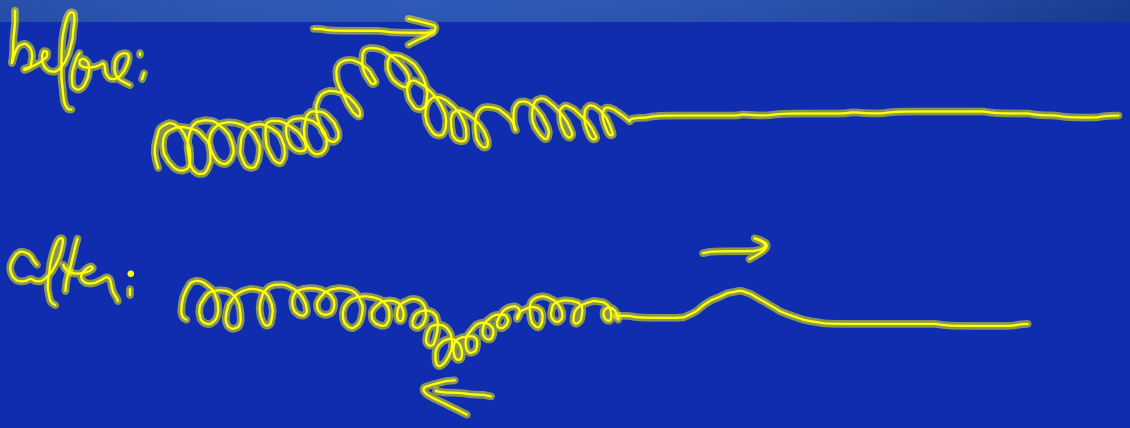
slow → fast:
- v increases
- A?
- λ increases

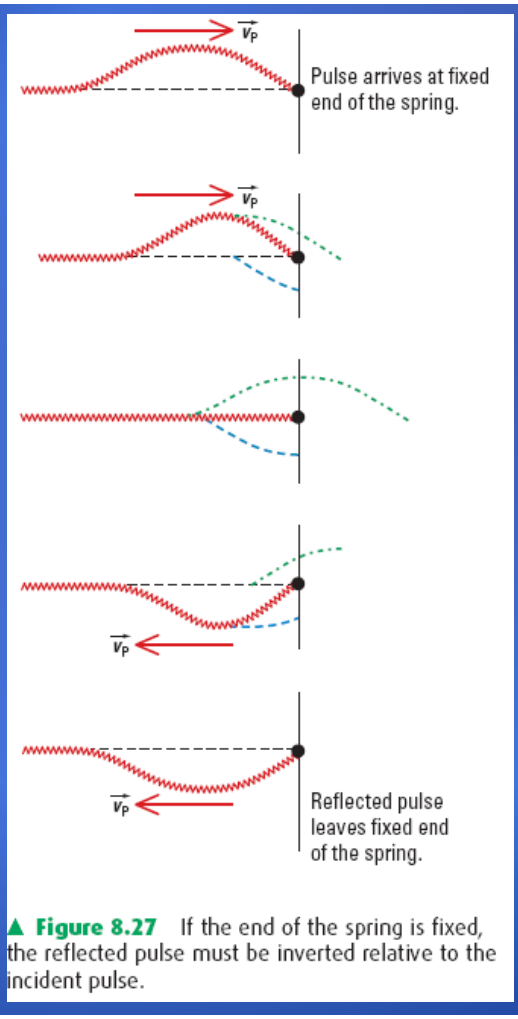
cont....

2. ...reflected back into the original medium. If the second medium is more difficult to travel through, the reflected pulse will be inverted.

slow → fast

fast → slow





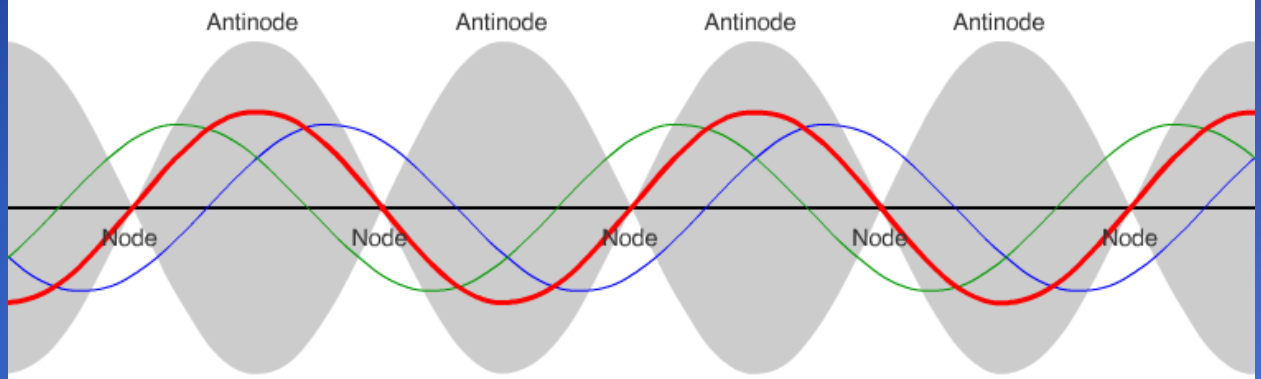
▲ **Figure 8.27** If the end of the spring is fixed, the reflected pulse must be inverted relative to the incident pulse.

Demonstration: Standing Waves on a Spring

A standing wave is one in which there are locations of minimum motion (nodes) and areas of maximum motion (antinodes).

Standing waves are produced by the interference of waves (on a spring or in water, these are the incoming and reflected waves).

Standing Waves



Step Step Play

A Standing Wave (red) can be formed by the superposition (addition) of two traveling waves, of equal amplitude and frequency, one traveling to the right (blue) and the other traveling to the left (green). Note that the Standing Wave doesn't travel to the right or to the left.