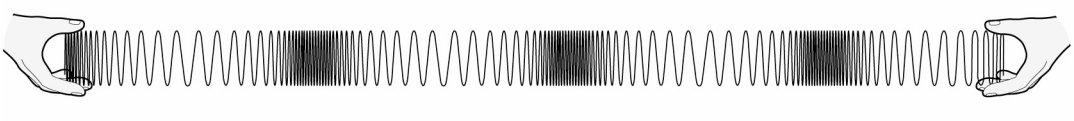
InterActions Unit 2 Cycle 1 Sample Quiz KEY

For Questions 1 through 3.

Bob and Joe are each holding an end of a long spring. Bob moves his hand back 2 cm and forth 2 cm, 3 times per second to create a wave that looks like this



1. What is the frequency of the wave?

    a. 5 Hz

    b. 4 Hz

    c. 3 Hz

    d. 2 Hz

    The frequency of the wave is the same as the number of times Bob moves his hand back and forth in a second. To answer this question you need to be able to identify the frequency. Use the Scientists' Consensus sheets to review mechanical wave-interactions.

2. How did Bob move his hand to create this wave?

    a. Bob moved his hand back and forth in the sideways (perpendicular) direction to the spring.

    b. Bob moved his hand back and forth in a diagonal direction to the spring.

    c. Bob moved his hand back and forth in the direction of the spring.

    d. Bob moved his hand back in a circular motion.

    This type of wave is created by an object that vibrates along the direction of the wave. To answer this test question you need to know how this wave pattern is generated. Use the Scientists' Consensus sheets to review mechanical-wave interactions.

3. What type of wave is this?

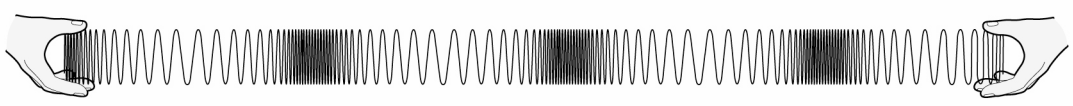
    a. Transverse.

    b. P-wave.

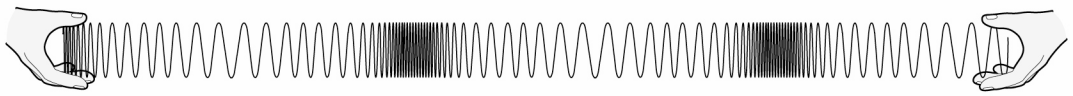
    c. S-Wave.

    d. Compression.

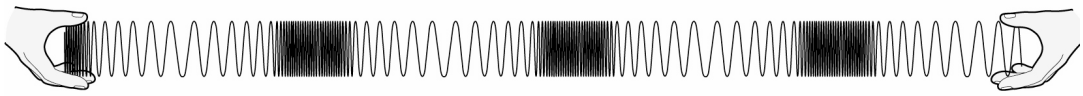
    To answer this test question you need to know what a compression wave looks like. Use the Scientists' Consensus sheets to review mechanical-wave interactions.



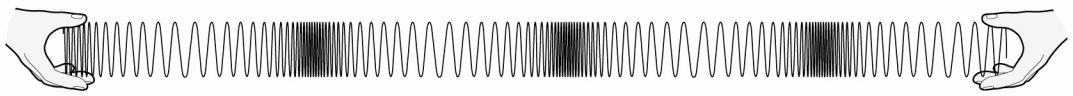
A.



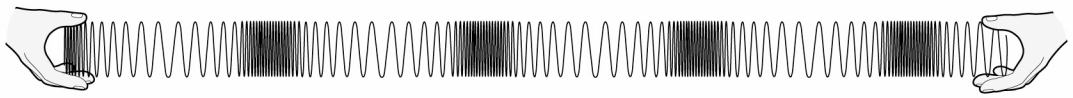
B.



C.



D.



4. Which image above (A, B, C, or D) represents an increase of amplitude of the wave?

    a. A

    b. B

    c. C

    d. D

    The amplitude is the maximum distance that each particle of the medium moves forward or backwards from its original position before the wave passes by. To answer this question you need to know how to identify the amplitude of a wave. Use the Scientists' Consensus sheets to review mechanical-wave interactions.

5. Which image above (A, B, C, or D) represents a decrease in wavelength of the wave?

    a. A

    b. B

    c. C

    d. D

    The wavelength is a measure of the distance between the compressed areas of the wave or the length of the wave before it repeats itself. To answer this test question you need to know how to identify the wavelength of a wave. Use the Scientists' Consensus sheets to review mechanical-wave interactions.

6. Jack moves a stick up and down in a tank of still water. A water wave moves outward from the stick. A nearby leaf floating in the tank begins to move. The leaf

    a. moves up and down as the wave passes by.

    b. moves up and down and forward with the wave.

    c. moves forward with the wave, riding on the peak of the wave.

    d. moves forward with the wave, riding in the low point of the wave.

    e. doesn't move.

    To answer this test question you need to know how a wave interacts with an object as the wave passes by. Use the Scientists' Consensus sheets to review mechanical-wave interactions.

7. Sandra rides her bicycle from her house to school. Her speed varies from 0 to 0.28 miles/min. The trip takes her 20 min to travel the 3 mile distance. Sandra's average speed is

    a. 0.14 min/mile

    b. 0.14 miles/min

    c. 0.10 miles/hour

    d. 0.15 min/mile

    e. 0.15 miles/min

    Sandra's average speed is the total distance she travels divided by the total time it takes her or 3 miles/20 min = 0.15 miles/min. To answer this test question you need to know how to calculate the average speed and the units of speed. See the Scientists' Consensus sheets for assistance.

8. Maurice runs track. His race speed varies from 0 to 5 m/s. His average race speed is 4.5 m/s. If Maurice runs the 400 m race, about how much time should it take him?

   a. 44.4 s

   b. 160 s

   c. 88.9 s

   d. 80 s

   From the relationship

$$Average\ speed\ =\ \frac{Total\ distance\ traveled}{Total\ time\ of\ travel}$$

   Rearranging we have

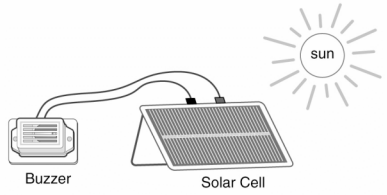
$$Total\ time\ of\ travel\ =\ \frac{Total\ distance\ traveled}{Average\ Speed}$$

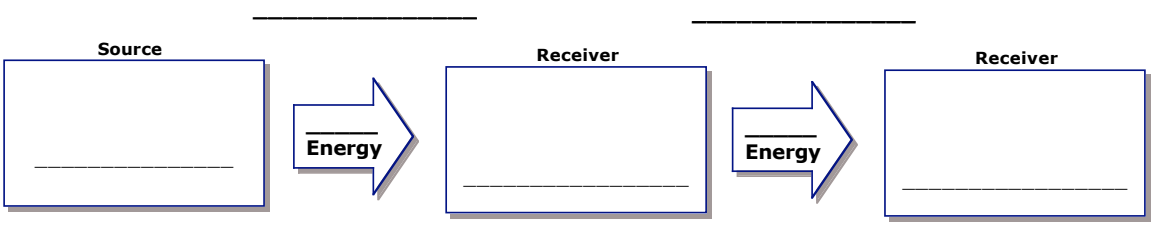
   Maurice should take about

$$Total\ time\ of\ travel\ =\ \frac{Total\ distance\ traveled}{Average\ Speed} = \frac{400\ m}{4.5\ m/s} = 88.9s$$

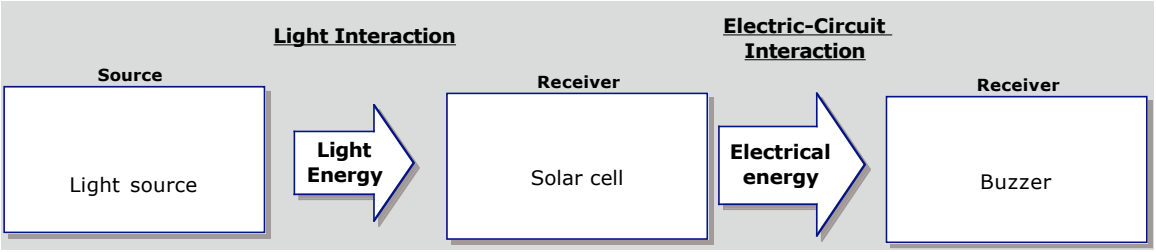
   To get a sense of these numbers, Maurice runs a mile in 5.96 minutes, and 400 m is about ¼ of a mile. To answer this test question you need to calculate the time of travel given the average speed and the total distance traveled. See the Scientists' Consensus sheets for assistance.

9. A light source shines on a solar cell connected in a closed circuit containing a buzzer. Complete the energy diagrams below





Answer:



To answer this test question you need to construct an energy diagram, listing the source, receiver, energy transferred, and type of interaction for a situation you have not analyzed before.