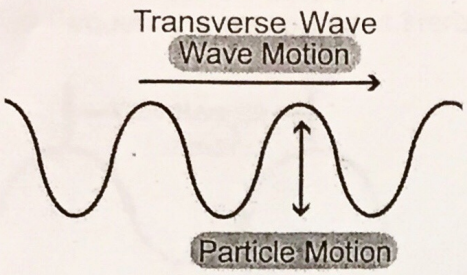
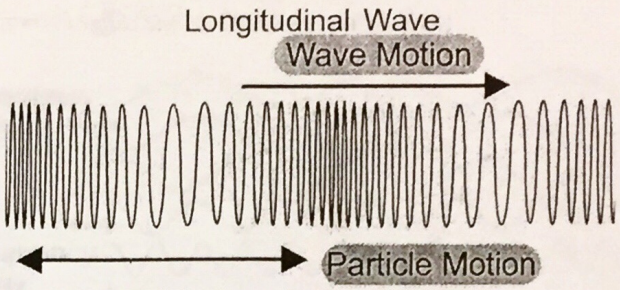
Unit 4 Review Assignment
www.nsdscience.weebly.com

Waves: Introduction and Types

Instructions: Read through the information below. Then complete the statements at the bottom of the page using the BOLD words from the page.

A wave is a transfer of energy through a medium from one point to another. Some examples of waves include; water waves, sound waves, and radio waves. Waves come in two different forms; a **Transverse** Wave which moves the medium *perpendicular* to the wave motion, and a **Longitudinal** Wave, which moves the medium *parallel* to the wave motion.



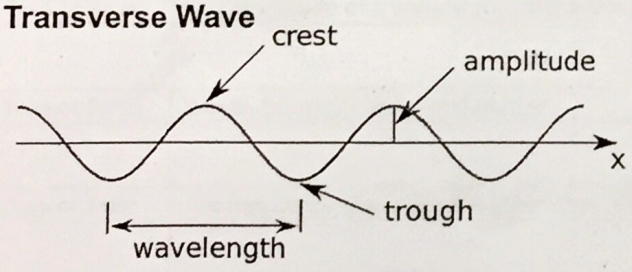


Examples of Transverse waves would be a vibrating guitar string or electromagnetic waves, while an example of a Longitudinal wave would be a "Slinky" wave that you push and pull.

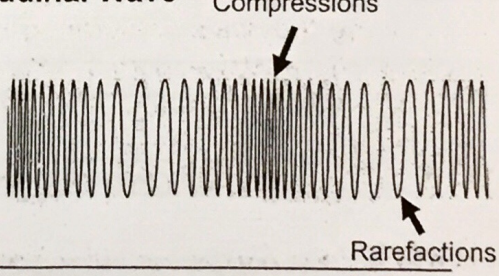
Waves have several properties which are represented in the diagrams below. In a Transverse wave the **Crest** and Troughs are the locations of maximum displacement up or down. The **Amplitude** is the measurement of maximum displacement. The **Wavelength** is the distance of one complete wave cycle. For example; the distance from crest to crest or trough to trough would be 1 wavelength.

In a Longitudinal wave, areas of maximum displacement are known as **Compressions** and **Rarefactions**. The stronger the wave, the more compressed and spread out the wave medium becomes.

Transverse Wave



Longitudinal Wave



Fill in the statements using the BOLD words from the above information.

1- Wave motion that is Parallel to wave direction describes a _____ wave.

2- A _____ is the maximum upwards displacement in a Transverse wave.

3- One complete wave cycle is referred to as a _____.

4- Wave motion that is Perpendicular to wave direction describes a _____ wave.

5- A _____ or _____ is the maximum displacement in a Longitudinal wave.

6- An Ocean wave would be an example of a _____ wave.

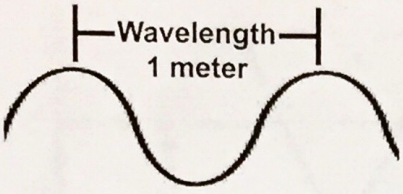
7- The distance from one trough to another trough is called a _____.

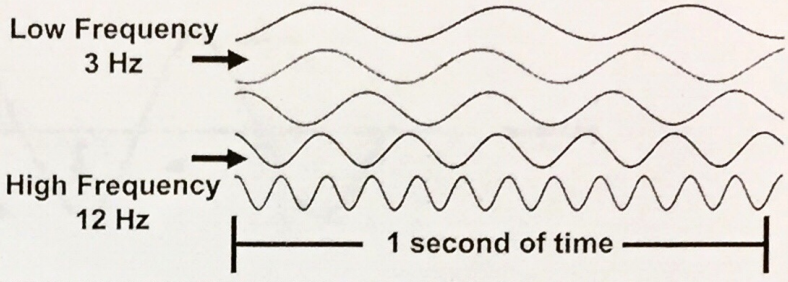
8- The measurement of displacement is called a wave's _____.

Waves: Velocity and Frequency

Instructions: Read through the information below. .
the bottom of the page.

The velocity of a wave can be calculated if you have enough information. First you need to know the *Wavelength*, or the length of one complete wave cycle. This could be measured Crest to Crest, Trough to Trough, or any other complete cycle of a wave. The second aspect you need is the wave *Frequency*, or the number of waves or vibrations produced per second. The frequency is measured in Hertz and the Wavelength is measured in meters.





The equation for calculating the velocity of a wave is:

Velocity = Wavelength x Frequency $v = \lambda \times f$

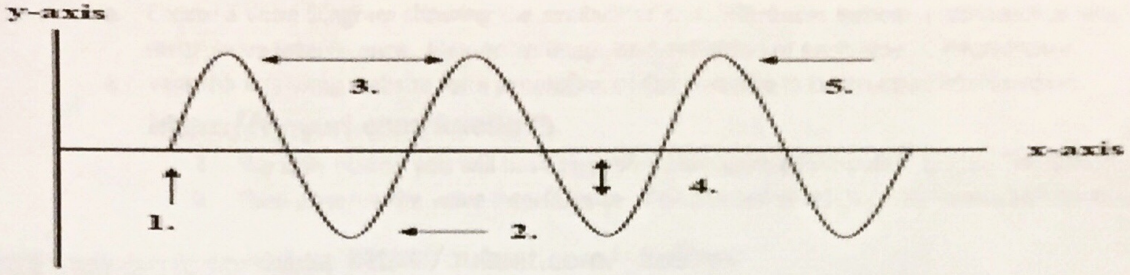
- Some of the following statements are true and some are false. Indicate if the statement is True or False. If the statement is false, write the correct version in the space below.

True or False	Waves can be longitudinal or transverse.
True or False	The amplitude of a wave is the distance from crest-to-crest.
True or False	Waves transfer energy and matter.
True or False	The frequency of a wave describes how often the wave oscillates every second.
True or False	In a longitudinal wave the medium vibrates in a direction parallel to the direction of wave travel.
True or False	In a transverse wave the medium vibrates in a direction parallel to the direction of wave travel
True or False	Destructive interference occurs when two waves combine to create a smaller wave.
True or False	Constructive interference occurs when two waves combine to cancel out (zero amplitude)
True or False	The speed (velocity) of a wave is calculated with the equation: Velocity = Freuency × Amplitude

Unit 4 (Waves) Review Assignment

Class Website: www.nsdscience.weebly.com

1. Waves - Learning Target 4.1
   - **a.** What is the scientific definition of a wave?
     - **i.** What do waves carry?
     - **ii.** What do waves not carry?
   - **b.** Label the parts of the wave below using the following terms: equilibrium, wavelength, trough, crest, amplitude.



   - **c.** Use the following website to check your understanding:
     https://www.purposegames.com/game/f9732c030a

2. Wave Types - Learning Target 4.2
   - **a.** What is the difference between a transverse wave and a longitudinal wave?
     - **i.** What is a synonym for a longitudinal wave?
   - **b.** Draw and label a diagram of each type of wave.
   - **c.** Use the following website to investigate a video depicting the motion of each type of wave:
     https://www.acs.psu.edu/drussell/demos/waves/wavemotion.html

3. Wave Properties - Learning Target 4.3
   - **a.** How is wavelength defined?
   - **b.** What is meant by the "frequency" of a wave?
   - **c.** Define amplitude (of a wave).
   - **d.** What does the term "period" mean in reference to a wave?
   - **e.** How does one calculate the speed (or velocity) of a wave?
     - **i.** Visit the following website and use the information found there to answer the question below:
       https://tinyurl.com/ya4ov46s
       1. Adjust the "frequency" by dragging it up/down.
          - **a.** What happens to the wavelength as you increase frequency?
          - **b.** What happens to the wavelength as you decrease frequency?
            - **i.** Are wavelength & frequency directly OR indirectly related?
     - **ii.** Visit the following website: **https://tinyurl.com/7uqztgo**
       1. Adjust the "frequency" by grabbing and sliding the green triangle to the right.
          - **a.** What happens to the energy of the wave as frequency increases?
          - **b.** What happens to the energy of the wave as frequency decreases?
            - **i.** Are frequency & energy directly OR indirectly related?

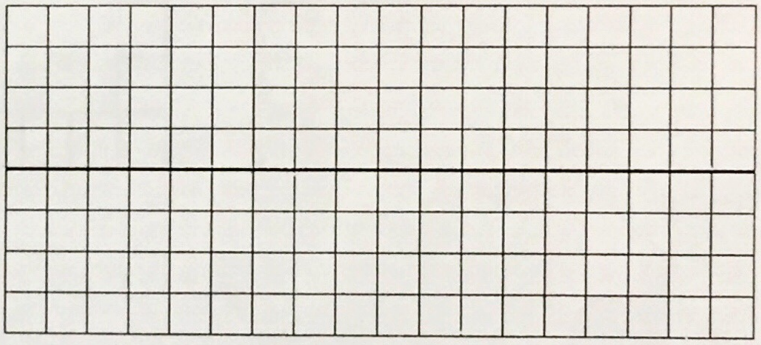
4. Wave Interactions - Learning Target 4.4
   a. Define the following wave interactions include a diagram of each. Use the following website to help with the diagrams: https://science.nasa.gov/ems/03_behaviors
      i. Reflection
      ii. Refraction
      iii. Diffraction
      iv. Absorption

5. Wave Interference - Learning Target 4.5
   a. Create a Venn Diagram showing the similarities and differences between constructive interference & destructive interference. Include an image and definition of each type of interference.
   b. Visit the following website for a simulation of Constructive & Destructive Interference: **https://tinyurl.com/kue9q75**
      i. The only button you will have to push is the "right-going-pulse" button "negative" or "positive"
      ii. Then observe the wave interference. Can you tell which is constructive and destructive?

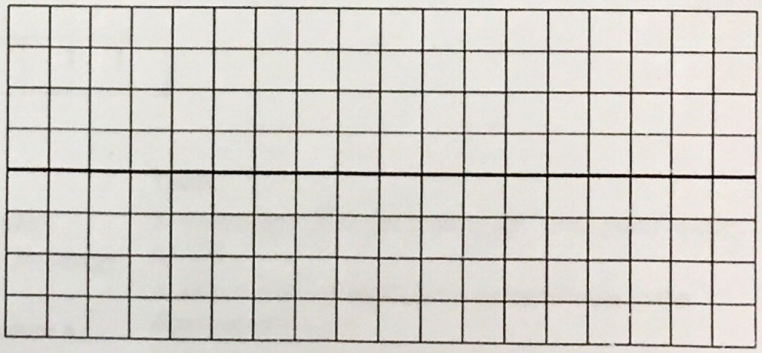
Unit 4 Vocabulary Review Quizlet: **https:/quizlet.com/_5p9lmf**

6 Use the grids below to draw the following waves. Be sure to label the *y*-axis to indicate the measurement scale.

a. A wave with an amplitude of 1 cm and a wavelength of 2 cm



b. A wave with an amplitude of 1.5 cm and a wavelength of 3 cm



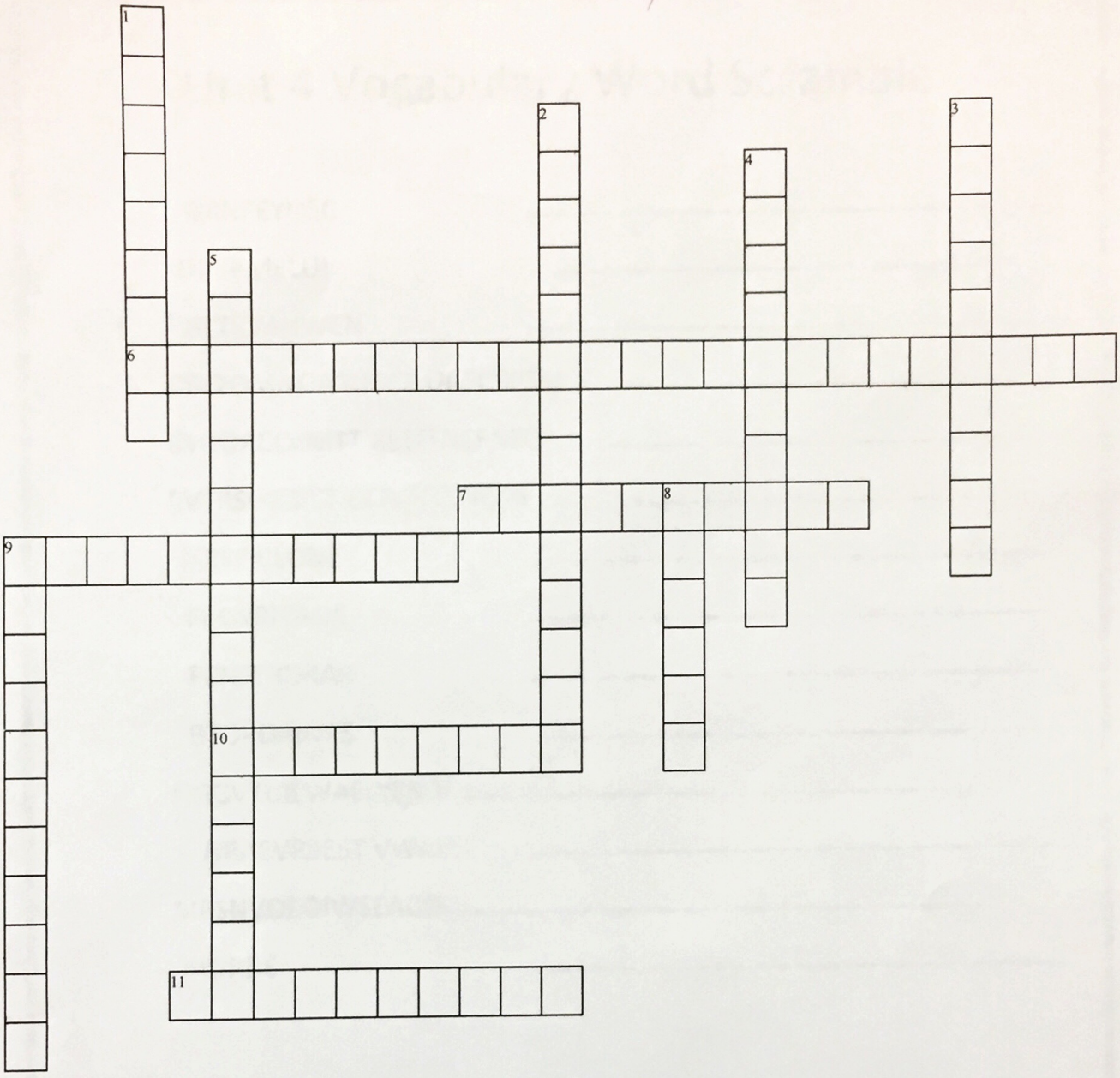
7 The period of a wave is equal to the time it takes for one wavelength to pass by a fixed point. You stand on a pier watching water waves and see 10 wavelengths pass by in a time of 40 seconds.

a. What is the period of the water waves?

b. What is the frequency of the water waves?

c. If the wavelength is 3 meters, what is the wave speed?

Unit 4 Vocabulary Crossword



Across

6. when two waves combing to create a larger wave

7. when a wave contacts an object and transfers its energy from the wave to the object

9. interference when two waves combine to produce a wave of smaller amplitude

10. the size of a wave OR the maximum distance the wave gets away from equilibrium (center)

11. when a wave passes directly through an object changing its angle on the way in and out

Down

1. the number of waves passing any given point in one second

2. a wave that has oscillations perpendicular to the direction of travel

3. the distance from the crest to crest of a wave

4. when a wave contacts an object and bounces off the surface in a new direction

5. a wave with oscillations parallel to direction of travel.

8. the time it takes of a wave to complete one cycle

9. when a wave passes through an opening (or around) an object and changes direction

Unit 4 Vocabulary Word Scramble

QRNFEYUEC _____

DPTAMELUI _____

GLTEVAHWEN _____

CEETOMNGARITLCE URECTPSM _____

SVUORCCENITT REEITNEFNECR _____

EVTRSUEDICT EERENTENCRIF _____

TREFICLONE _____

FRCNRITAOE _____

FCNFTIIDRAO _____

BTOPOAINRS _____

NOGVTUILWAEDSINAL _____

NRAEVRSEST VWAES _____

MPSNVOEOIWSEACSR _____

IROPDE _____