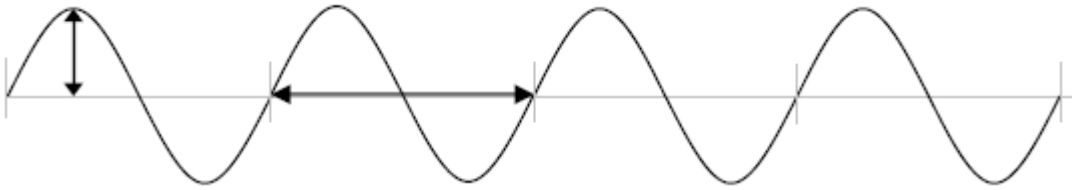
Name: _____
Date: _____ Period: _____

# Transverse Wave Worksheet

Amplitude One full wave (cycle)



***Define each of the following vocabulary terms:***

Amplitude –

Wavelength –

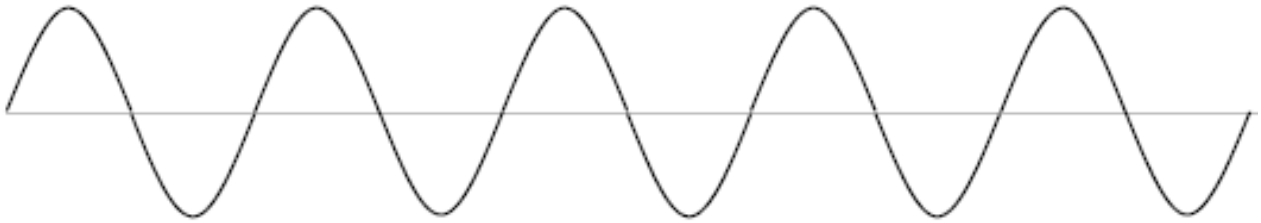
Frequency-

Wave speed = (wavelength) x (frequency) $v=\lambda f$

**Measuring Practice:**

A camera takes a picture of a wave in a string for one full second. You can use a ruler to measure in centimeters. For each wave answer the questions and measure parts of the wave.

**Wave 1**



1. How many full wavelengths are there in this wave? _____

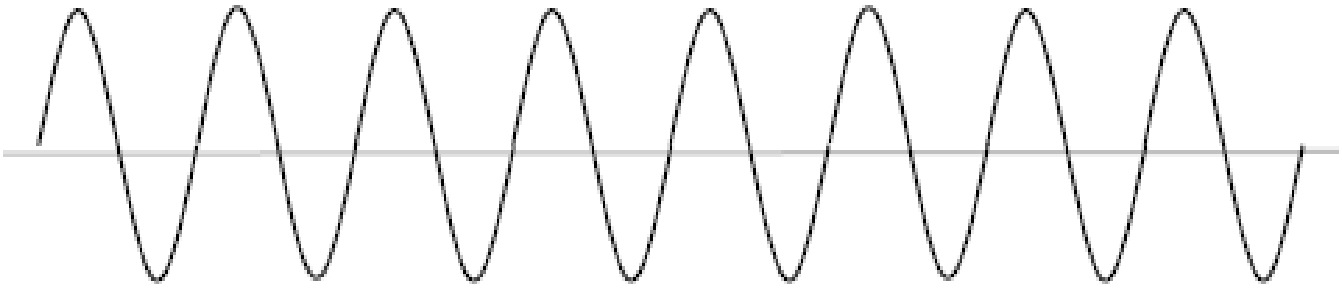
2. Measure one Wavelength: _____ cm 3. Measure the Amplitude: _____ cm

4. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

5. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

**Wave 2**



1. How many full wavelengths are there in this wave? _____

2. Measure one Wavelength: _____ cm

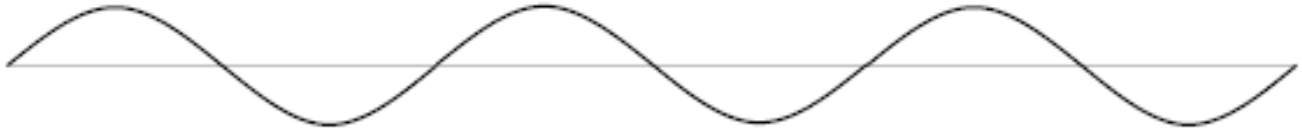
3. Measure the Amplitude: _____ cm

4. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

5. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

**Wave 3**



1. How many full wavelengths are there in this wave? _____

2. Measure one Wavelength: _____ cm

3. Measure the Amplitude: _____ cm

4. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

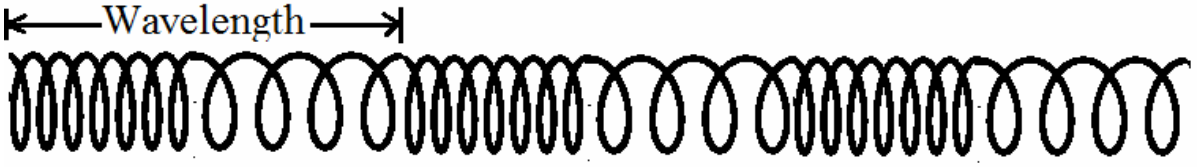
5. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

Name: _____
Date: _____ Period: _____

# Longitudinal Wave Worksheet

One full wave (cycle)




***Define each of the following vocabulary terms:***

Period –

Compression -

Rarefaction -

Wave speed = (wavelength) x (frequency) $v=\lambda f$

Frequency and Period are *inversely* related $f = {}^{1}/_{T}$ and $T = {}^{1}/_{f}$

**Measuring Practice:**
A camera takes a picture of a longitudinal wave for one full second. You can use a ruler to measure in centimeters. For each wave answer the questions and measure the parts of the wave.

**Wave 1**

1. How many full wavelengths are there in this wave? _____

2. Measure one Wavelength:_____ cm

3. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

4. If you were to time how long it takes one complete wavelength to pass you buy, you would have measured the _____.

5. What is the period of this wave?

***G U E S S***

6. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

**Wave 2**

1. How many full wavelengths are there in this wave? _____

2. Measure one Wavelength:_____ cm

3. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

4. If you were to time how long it takes one complete wavelength to pass you buy, you would have measured the _____.

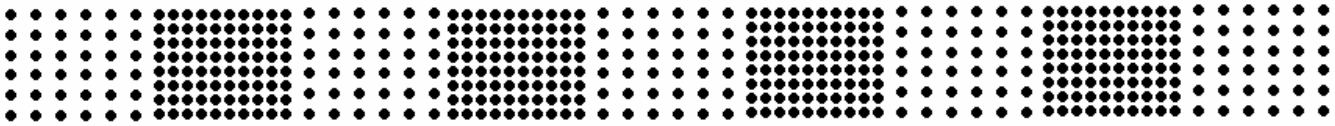
5. What is the period of this wave?

***G U E S S***

6. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

**Wave 3**



1. How many full wavelengths are there in this wave? _____

2. Measure one Wavelength:_____ cm

3. If this picture was taken over one second, what is the *frequency* of the wave? _____ Hz

4. If you were to time how long it takes one complete wavelength to pass you buy, you would have measured the _____.

5. What is the period of this wave?

***G U E S S***

6. You measured the wavelength and found the frequency of the wave. Use these two measurements to calculate the speed of the wave in centimeters per second (cm/s):

***G U E S S***

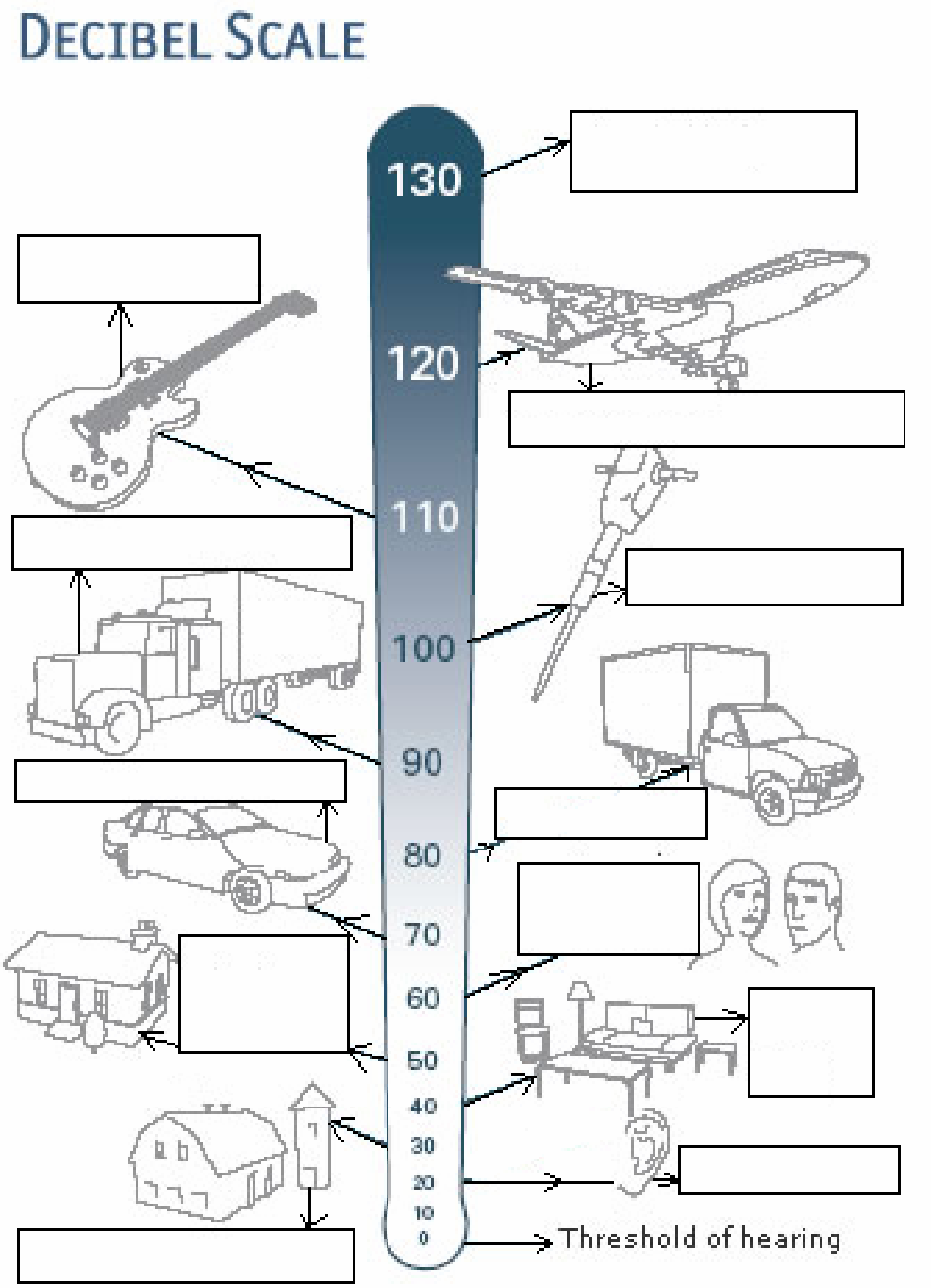
Name: _____
Date: _____ Period: _____

# DECIBEL SCALE PRACTICE

On a decibel scale, sounds are ranked according to their sound level or volume. Add these examples of different decibel levels to your blank scale after looking at the clues below.

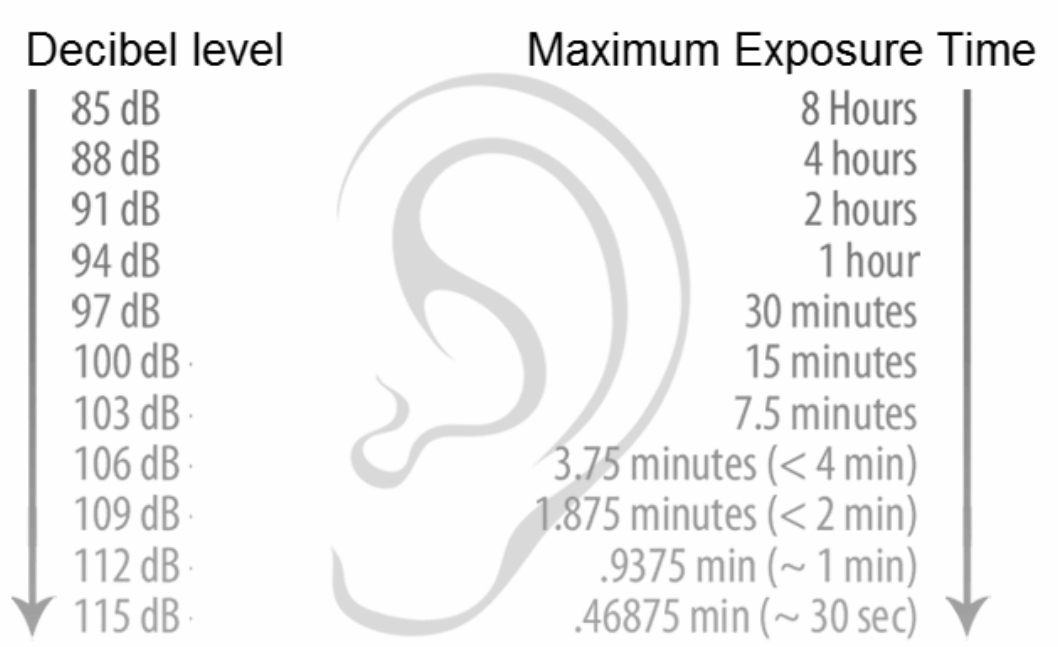
Examples to write on your scale:

- Threshold of pain
- Being in a small car
- Medium sick truck
- Seeing a rock band in concert
- Jack hammer
- Whisper
- Quiet rural neighborhood
- Being near a 747 jet when it takes off
- Normal conversation
- Quiet suburban setting
- Big Semi truck
- Quiet living room




↓ **Continue**

Listening to sounds that are too loud for too long can cause hearing damage. A single loud sound can cause hearing damage you will suffer with for your entire life! Review this chart and the one on the other side of this page to answer the questions below.




1. Construction workers often have to use heavy equipment life jack hammers and they often wear professional grade ear protection. If a construction worker *did not* wear ear protection, how long should they use a jack hammer before stopping so that they don't damage their ears? _____

2. Rock concerts have legal limits to their sound level so that they do not hurt the audience members' ears. Unfortunately many concerts are above safe values and the average rock concert is quite loud. How long should you listen to a rock concert without ear protection? _____

3. Ear plugs are <u>always</u> available at First Aid stations at concert halls and other music venues. Even cheap foam ear plugs can reduce sound levels by 20 dB. If you were to wear ear plugs at a concert that reduced the decibel level by 20 dB, *then* how long could you listen without causing hearing damage? _____

4. Airport employees that have to work on the runway can be exposed to incredibly loud sounds. If they did not wear ear protection, how long should they listen to the sounds of airplanes taking off around them? _____

5. Runway workers, like construction workers, wear professional grade ear protection. Most of their professional ear protection can reduce sound levels by 40 dB. How long could a runway worker be exposed to the sound of a 747 jet taking off without getting causing hearing damage if they wear this protection? _____

6. Gun shots can be as loud as 140 dB and even though they only last for a second, or less, can cause hearing damage. When firing a gun at a firing range, participants must wear ear protection. If they use the same professional grade ear protection as the runway workers and the construction workers, how long could they fire their weapon without causing hearing damage?

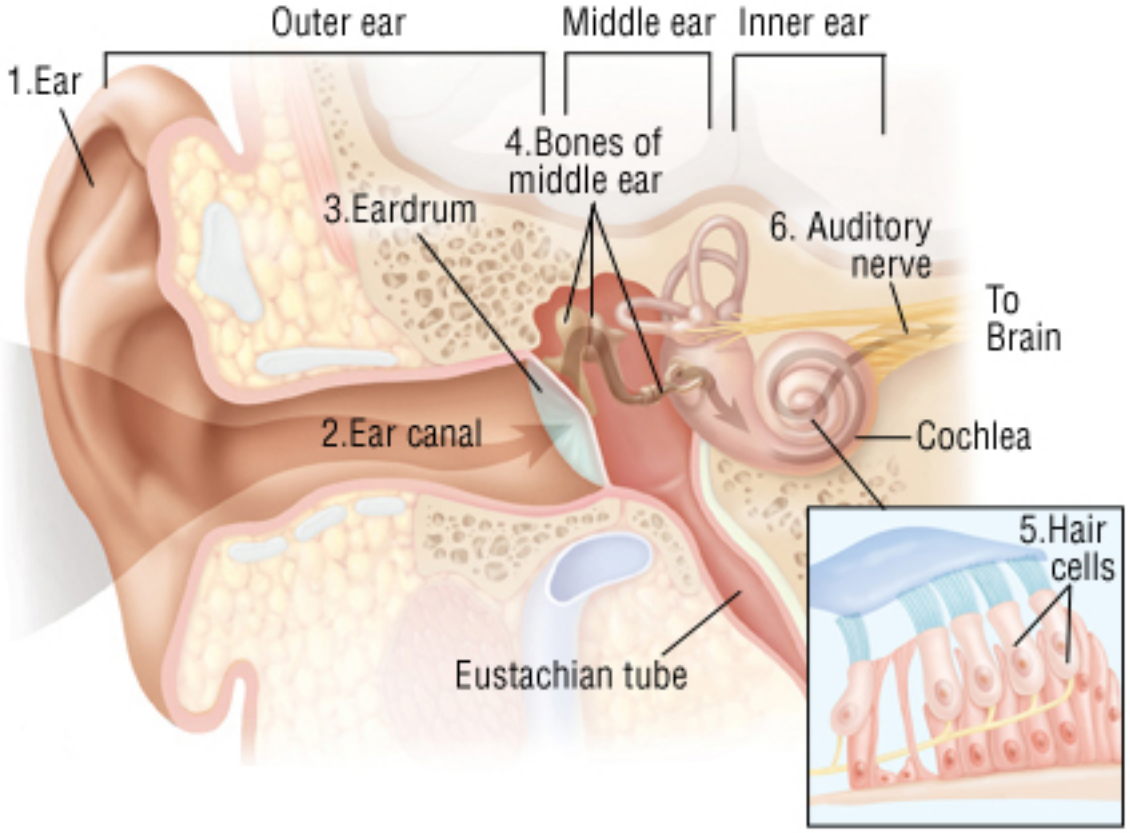
   _____

Name: _____

Date: _____ Period: _____

# How the Ear Works

Refer to this picture of a human ear and identify the correct part of the ear for each statement below:




A. Sound is collected by the _____ and directed into the ear canal.

B. Sound waves travel through the _____ and strikes the eardrum.

C. The _____ is also called the tympanic membrane and vibrates when sound strikes it.

D. The vibrations in the ear drum make the _____ to vibrate as well and they pass the vibrations through the middle ear.

E. When the small bones of the middle ear vibrate they push on a small window in the _____ which causes the fluid inside it to vibrate as well.

F. Inside the cochlea there are tiny _____ that are moved around by the fluid after the tiny bones in the ear vibrate.

G. The tiny hair cells in the ear are attached to nerves and send signals to the brain through the _____ about the sound they heard.

**Hearing Damage**:

Sometimes hearing damage is caused by sounds that are too loud, or have too much amplitude. This can cause damage to *two* different parts of the ear because the vibrations (sound waves) are too big. Looking at this diagram, discuss the *two* different parts of the ear that can be damaged due to sounds that are too loud below:

Name: _____
Date: _____ Period: _____

# Wave Review Worksheet

**Word Bank:** Match each term with the sentence below

| | | |
|---|---|---|
| Electromagnetic Wave | Medium | Matter |
| Mechanical Wave | Crest | Compression |
| Longitudinal Wave | Trough | Rarefaction |
| Transverse Wave | Energy | Wavelength |

_____: The highest point of a transverse wave

_____: The area in a longitudinal wave where the particles are close together.

_____: The ability to move or change an object, or what a wave carries.

_____: A wave that is caused when energy causes a vibration thru a medium.

_____: Type of mechanical wave in which the energy runs at right angles to the wave.

_____: Type of mechanical wave in which the energy flows parallel to the wave.

_____: A wave that can travel through empty space, like light waves

_____: The lowest point of a transverse wave.

_____: Area in a longitudinal wave in which the particles are spread out.

_____: The material through which a mechanical wave travels.

**Review Questions:** *Answer each question below*

1. What is a *medium*? Give 3 examples.

2. Draw a transverse wave in a string and label all five parts.

3. Draw a longitudinal wave in a spring and label all three parts.

4. Draw a spring in equilibrium.

5. How does a particle in a surface wave move?

6. What is the difference between a mechanical wave and an Electromagnetic wave?

7. What is frequency and how is it measured?

8. Calculate the wave speed of a wave that has a frequency of 5 Hz and has a wavelength of 10 meters. *Show GUESS.*

**G U E S S**

9. What is the period of a wave? How is it measured?

10. What is the formula to calculate wave speed? _____

11. What increases as amplitude increases? _____

12. What do *all* waves carry? _____

13. What is reflection? Give an example.

14. What is refraction? Give an example.

15. What is diffraction? Give an example.

16. What are the two types of interference? Which results in a larger wave? Which results in a smaller wave?

17. A wave travels at 13 m/s and the crests are 6 meters apart. How many waves would you see pass you by per second? *Show GUESS.*

**G U E S S**