

Name: \_\_\_\_\_ Period: \_\_\_\_\_

# **FORMS OF ENERGY STUDY GUIDE**

## **Parent Signature (3 % extra credit on test)**

I have gone over this study guide with my student for at least 30 minutes.

### Energy

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1. What is energy? (Use the definition in your notes.) List the 8 forms of energy.

*The ability to do work.*

*Mechanical, heat, electrical, electromagnetic, chemical, nuclear, elastic, gravitational*

2. Using your notes, write the definitions for the following forms of energy.

Heat- *the movement of atoms and molecules*

Electrical- *the movement of electrons*

Chemical- *the energy in the bonds between atoms, takes a chemical reaction to release it*

Nuclear- *the energy that holds a nucleus together. Must break an atom or create a new one to use it.*

3. What is potential energy? List the 4 forms of potential energy.

*Energy that is stored. Chemical, nuclear, elastic, gravitational*

4. What is kinetic energy? List the 4 forms of kinetic energy?

*Energy that is active or being used. Mechanical, electrical, electromagnetic, heat*

5. Which two factors affect the gravitational potential energy of an object? (Think of the pendulum lab)

*The height and weight of an object*

6. Where on a rollercoaster would you have the most potential energy? Kinetic energy?

*Most potential = top of tallest hill, kinetic = bottom of biggest hill*

7. What is the Law of Conservation of Energy and what does it mean about energy? (Look in your notes)

*Energy cannot be created or destroyed, it can only be changed. Energy is changing around us all the time.*

8. Determine which form of energy is being converted to which in the following situations:

A curling iron                      from *electrical* to *heat*

A windmill generator              from *mechanical* to *electrical*

A battery                              from *chemical* to *electrical*

A fire                                    from *chemical* to *electromagnetic & heat*

A radio                                 from *electrical* to *mechanical*

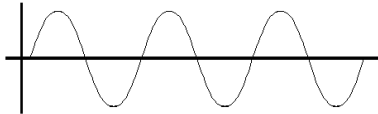
## Waves

1. List the key differences between mechanical and electromagnetic waves.

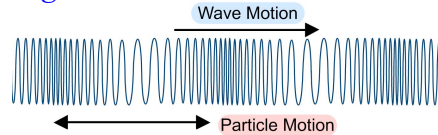
*They carry different types of energy, mechanical waves need a medium, mechanical waves come in three shapes*

2. List the 3 shapes mechanical waves come in and draw a picture of each.

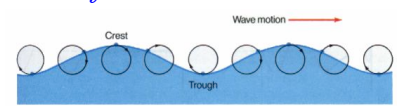
*Transverse*



*Longitudinal*



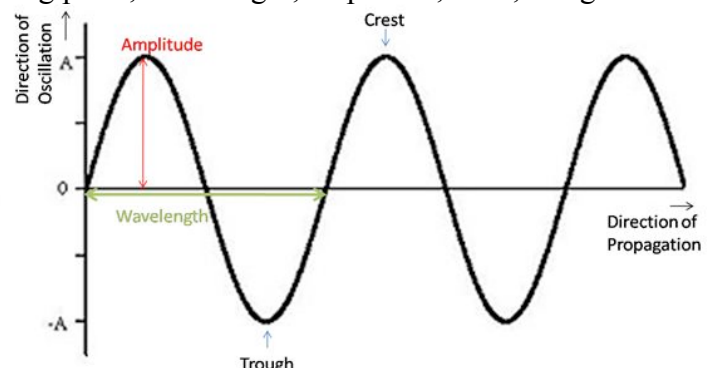
*Surface*



3. Is sound mechanical or electromagnetic? Which shape do sound waves have?

*Mechanical (it's not light! It MOVES things!) Sound has longitudinal waves.*

4. Draw a wave and label the following parts: resting point, wavelength, amplitude, crest, trough



5. What is frequency?

*Number of wavelengths per second*

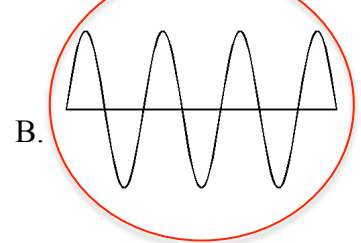
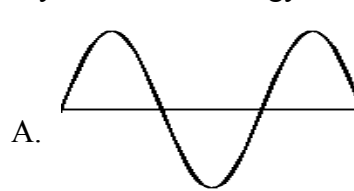
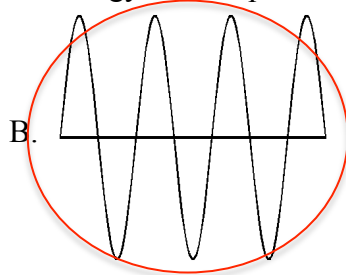
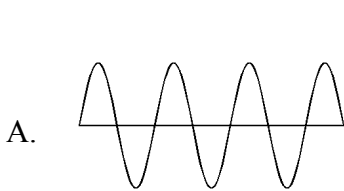
6. What happens to the wavelength of a wave if the frequency increases?

*As frequency increases, wavelength decreases*

7. List three ways you could increase the energy of a wave.

*Increase amplitude, increase frequency, shorten wavelength*

8. Circle the wave that has more energy in each pair. Tell why it has more energy.



## Light

1. Give the main uses for each of the waves in the electromagnetic spectrum.

Radio- *communication, radio/tv*

Microwaves- *cell phones, radar, cooking*

Infrared- *HEAT!!!! Night vision, remotes*

Visible light- *to see, TV, computer screens*

Ultraviolet- *tanning, sterilization, black lights*

X-rays- *Medicine and security*

Gamma- *killing cancer*

2. Which waves on the electromagnetic spectrum have the longest wavelength? The shortest?

*Radio, Gamma*

3. Which waves have the greatest frequency? The lowest?

*gamma, radio*

4. Which **color** has the longest wavelength? The shortest?

*Red, purple*

5. What is refraction? Give two different examples of refraction.

*The bending of light as it changes mediums*

6. Why is red always the top of the rainbow and purple always at the bottom?

*Red has the longest wavelength so it is less flexible and bends the least, purple is the opposite*

7. Why do images sometimes appear upside-down when viewed through a lens?

*The lens bends the light so much that it flips*

8. What do images look like that travel through your eye and land on your retina?

*Upside down*

9. Name the function of the following parts in your eye:

Pupil— *Hole that lets light into the eye*

Retina—*Layer of light sensitive cells where light Lands*

Iris—*Controls how much light enters the eye*

Optic Nerve—*Sends image to the brain*

## Sound

1. Sound is actually which type of energy? *Mechanical, kinetic*

2. Describe the way a sound wave moves. *It pushes the medium*

3. Does sound travel faster in solids, liquids, or gases? Why?

*Solids. The molecules are closest together*

4. What does increasing frequency do to the pitch of sound?

*Increases the pitch (makes it higher)*

5. What does increasing wavelength do to the pitch of sound?

*Decreases the pitch (makes it lower)*

## Heat

1. What is conduction? Give two examples.

*Heat transferred directly through touch—ironing clothes, frying an egg*

2. What is convection? Give two examples.

*Heat circulating in liquids/gases—hot air balloons, smoke rising*

3. What is radiation? Give two examples

*Infrared waves carrying heat—sunlight, heat lamp, fire*

4. Which wave on the electromagnetic spectrum carries heat?

*Infrared*

5. What is the only way heat can travel through space? Why?

*Radiation/Infrared waves—They don't need a medium, they are light!*

6. Explain how something that is really cold still has heat.

*It's molecules are still moving, just not as quickly*

7. What do most insulators have in common?

*They are less dense/have molecules that are farther apart*

8. Why are dense things good conductors?

*They have molecules that are close together that can pass the heat quickly*

### Variables

1. What is an independent variable?

*The variable that the experimenter changes or manipulates*

2. What is a dependent variable?

*The variable that responds or is a result*

3. What are controlled variables?

*Things you keep the same to keep your experiment fair*

Review Stations Fill in the answers to the questions at each station in the boxes below.

Station 1  <i>See website for separate document with stations and answers</i>	Station 2
Station 3	Station 4
Station 5	Station 6