Science 8

Optics I

Name:
Date:
Block:

1. **Optics Observations**
2. **Waves**

Optics Observations

Station #1: Prisms

Place one prism in front of a ray box. Can you find the rainbow?

What are the colours of the rainbow?

_____ _____ _____ _____ _____ _____

Station #2: Lenses

Use a ray box and see what happens when you place a **concave (caved in) lens** in front of the light. Draw what you see.

Ray Box	Concave Lens

Use a ray box and see what happens when you place a **convex (curved out) lens** in front of the light. Draw what you see.

Ray Box	Convex Lens

Station #3: Mirrors

Use a ray box and see what happens when you place a **concave (caved in) mirror** in front of the light. Draw what you see.

Ray Box	Concave Mirror

Use a ray box and see what happens when you place a **convex (curved out) mirror** in front of the light. Draw what you see.

Ray Box	Convex Mirror

Station #4: Curved Mirrors & Lenses

A **concave mirror** is a mirror that is caved in. Hold it close to your face.

Does the image seem: *larger* *smaller* // *upright* *upside down*

Now hold the concave mirror an arm's length away.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

A **convex mirror** is a mirror that is curved out. Hold it close to your face.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

Now hold the convex mirror an arm's length away.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

A **concave lens** is a lens that is caved in. Use it to look at this text.

Does the image seem: *larger* *smaller* // *upright* *upside down*

Now hold up the concave lens to look at an object on the other side of the room.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

A **convex lens** is a lens that is curved out. Use it to look at this text.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

Now hold the convex lens to look at an object on the other side of the room.

- Does the image seem: *larger* *smaller* // *upright* *upside down*

Waves

Can you name a few waves?

What is a wave?

- Disturbance or movement that _____ _____ through matter or space.
- Doesn't cause any _____ _____.
    - Example:

- This energy must move through a _____.
- The medium can be _____, _____, or _____.
    - Examples of mediums:

Typically, there are two types of waves:

Transverse Wave	**Compression Wave**
Definition: •	Definition: •
Example:	Example:
Diagram:	Diagram:

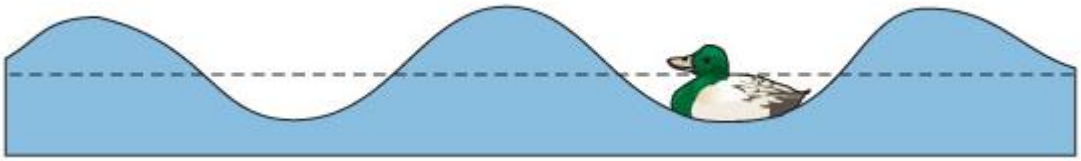
We will be focusing more on TRANSVERSE waves

Characteristics of a wave:

Crest: the _____ point in a wave.

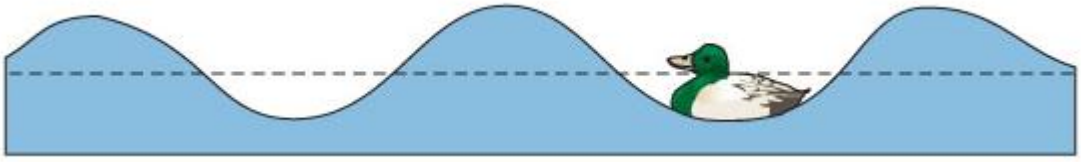
Trough: the _____ point in a wave.

Label the crest and trough on the following diagram:



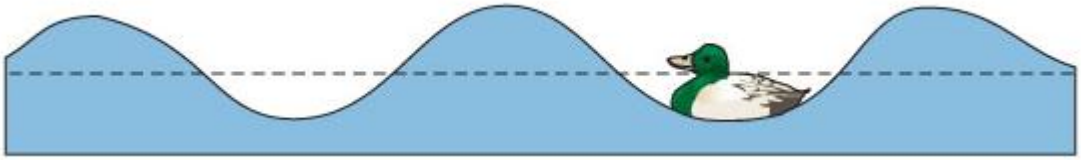
Rest Position: the level of water _____ the _____ and _____.

Label the rest position on the following diagram:



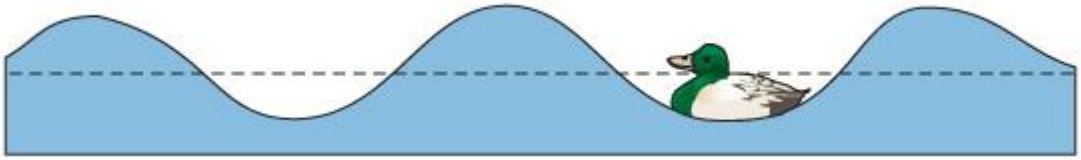
Amplitude: the _____ of the _____ or _____ of the _____ as measured from its _____.

Label the amplitude on the following diagram:

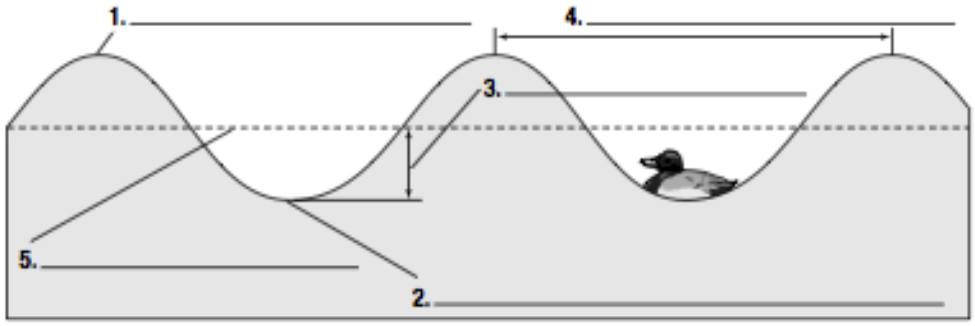


Wavelength: the _____ from _____ to _____ or _____ _____.

Label the wavelength on the following diagram:



Label the following diagram:

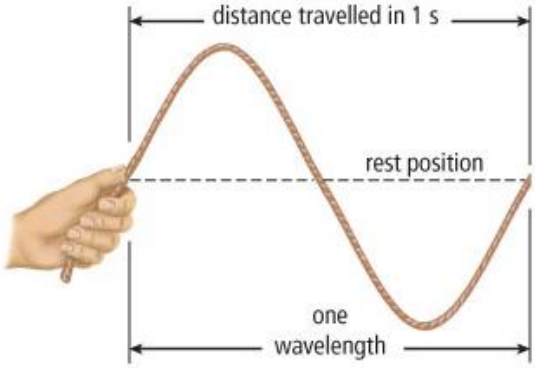


- Crest
- Trough
- Rest position
- Amplitude
- Wavelength

Frequency:

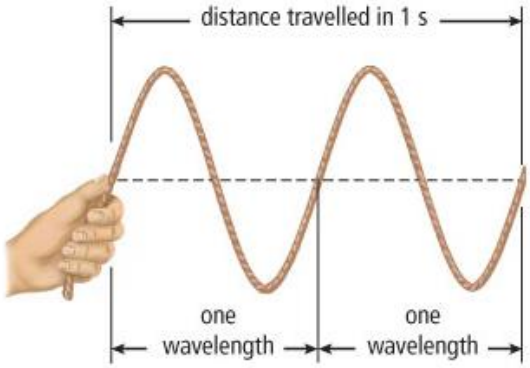
- How often does something occur?
- The number of _____ _____ in a given time.

Frequency is measured in _____ (___) or _____ ____ _____.



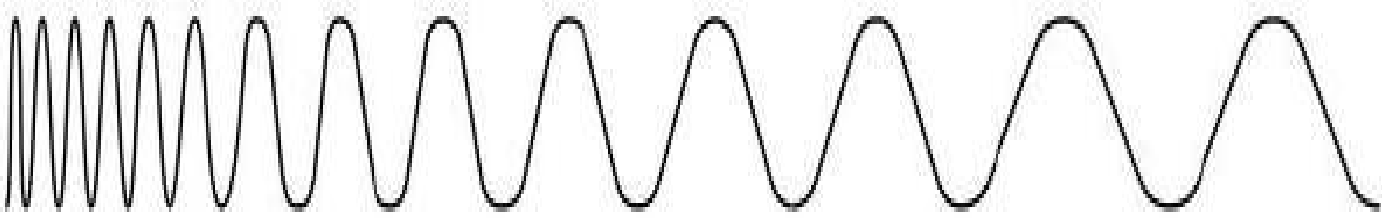
(a)

Frequency: ____ Hz



(b)

Frequency: _____ Hz



WAVELENGTH: long / short

FREQUENCY: high / low

WAVELENGTH: long / short

FREQUENCY: high / low

When one value increases as the other decreases, this is called an _____ relationship.

Bouncer A:	Bouncer B:
Number of bounces:	Number of bounces:
Time:	Time:
Frequency (bounces per second):	Frequency (bounces per second):

Who had the higher frequency?

Use the following equation to calculate frequency (in hertz) for each of the examples below:

Frequency = cycles per second

a) Pendulum: 24 swings in 6 seconds.

b) Merry-go-round: 12 revolutions per 2 min.

c) Flashing red light at an intersection: 30 flashes in 0.5 min.

d) Heart rate: 18 beats per 20 second.

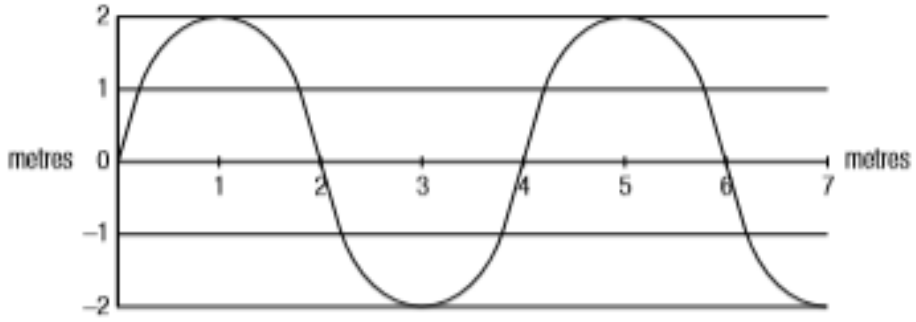
e) Car drive shaft: 2000 rpm (revolutions per minute)

Characteristics of waves

Use the information in the graphs to answer the questions.

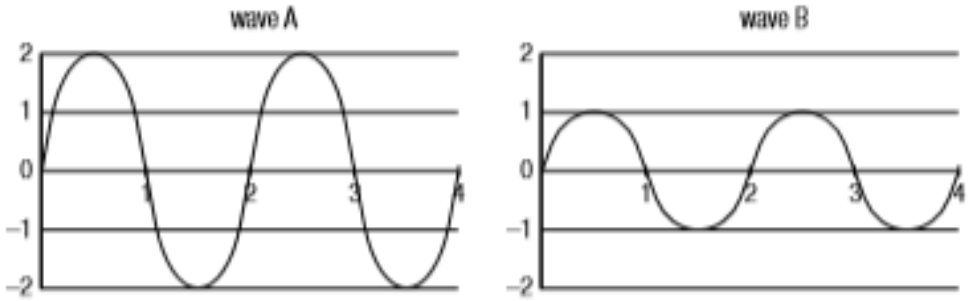
1. How long is the wavelength of the wave below? _____

2. How large is the amplitude of the wave below? _____



3. Which wave below has the smaller amplitude, A or B? _____

4. Which wave carries more energy, A or B? _____



5. What is the same for waves X and Y below: amplitude, wavelength, or frequency?

_____

6. Which wave has a greater frequency, X or Y? _____

7. Which wave has a longer wavelength, X or Y? _____