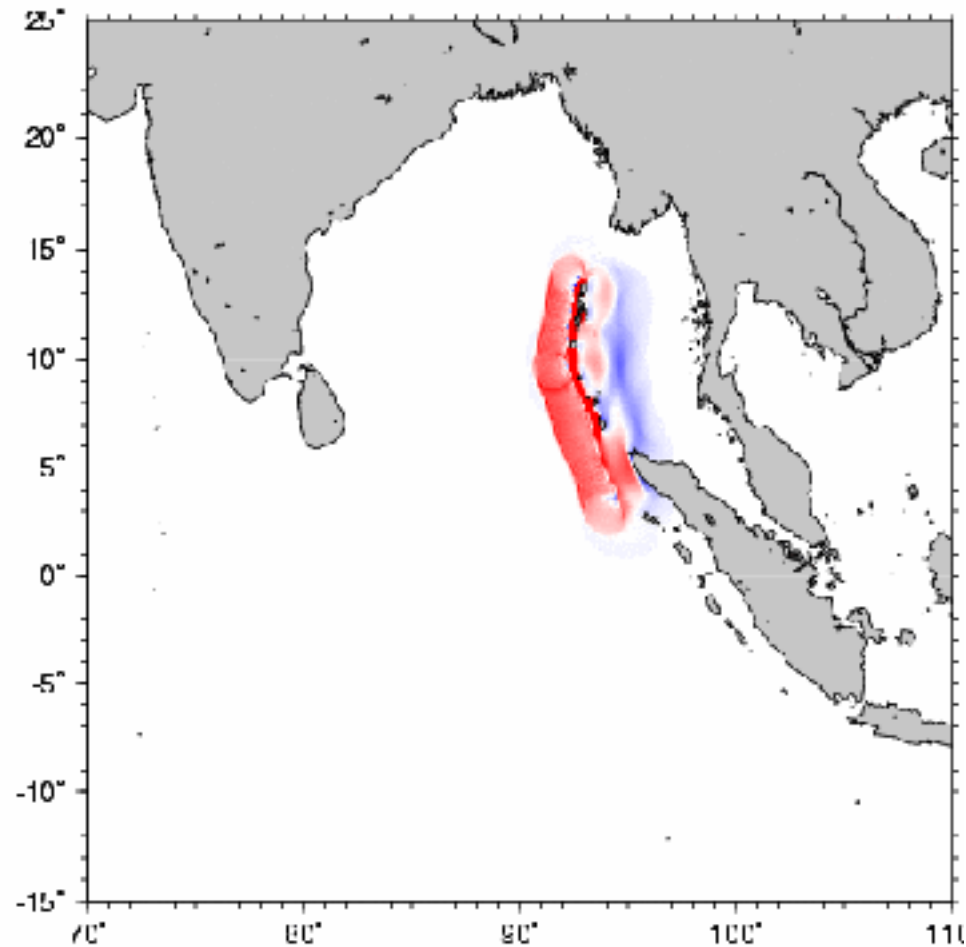


# Waves

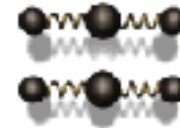
2004 Sumatra Earthquake 0+0 min



**Tsunami caused by  
Sumatra earthquake**

# Waves: Definitions

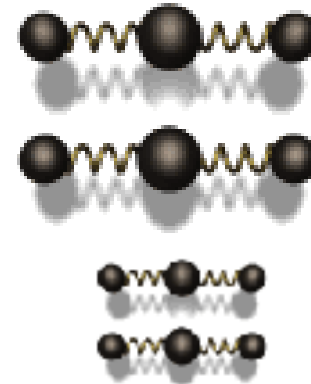
- **Vibration (V)** – Back and forth motion.



- **Frequency (F)** – The number of vibrations something makes in one second.



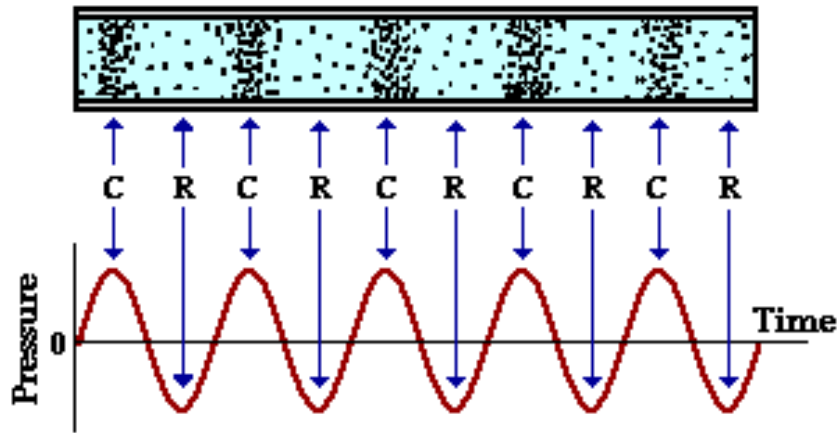
- **Amplitude (A)** – The size of the vibration.



- **Resonance** – Large vibrations when something is pushed at its natural frequency

# Waves: Sound

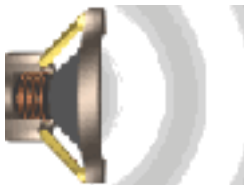
Sound is a Pressure Wave



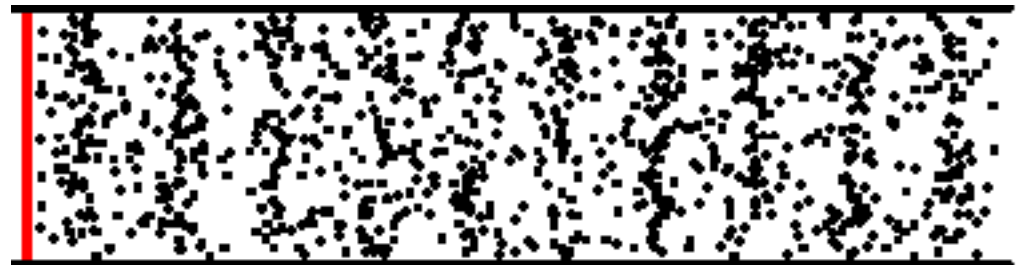
NOTE: "C" stands for compression and "R" stands for rarefaction



**Tuning Fork Cause air to be compress and rarified**

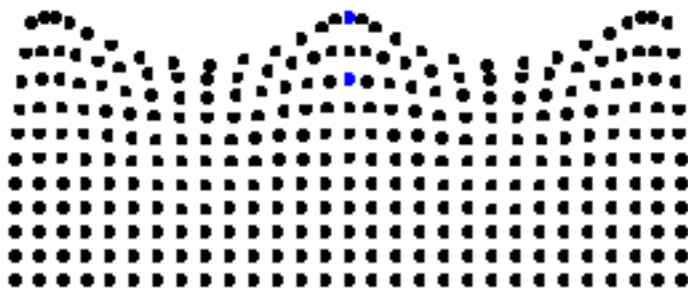
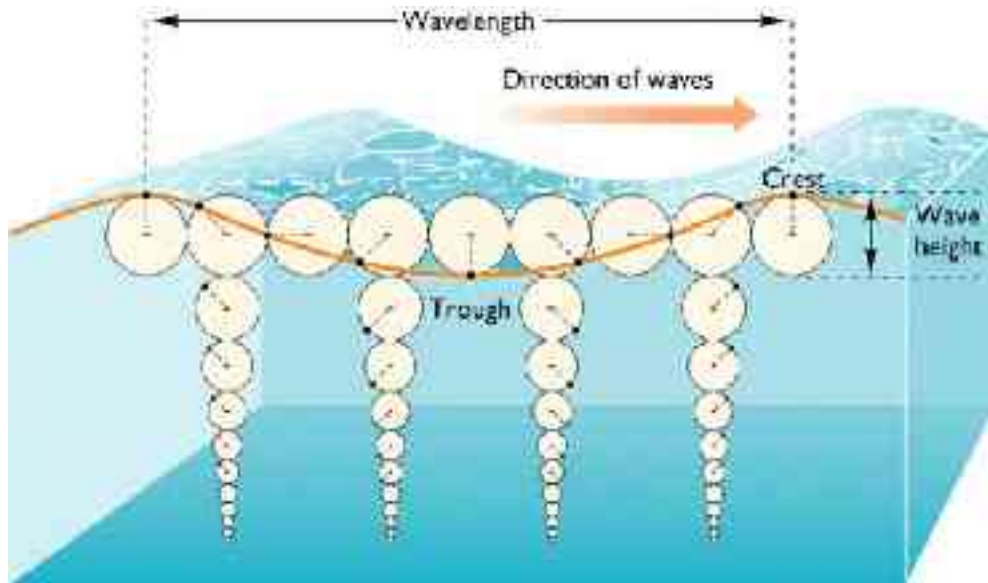


**Loudspeaker**

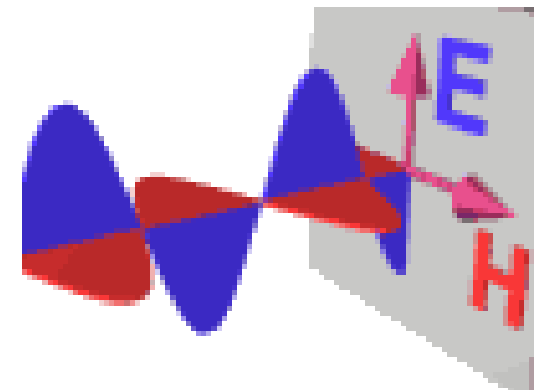
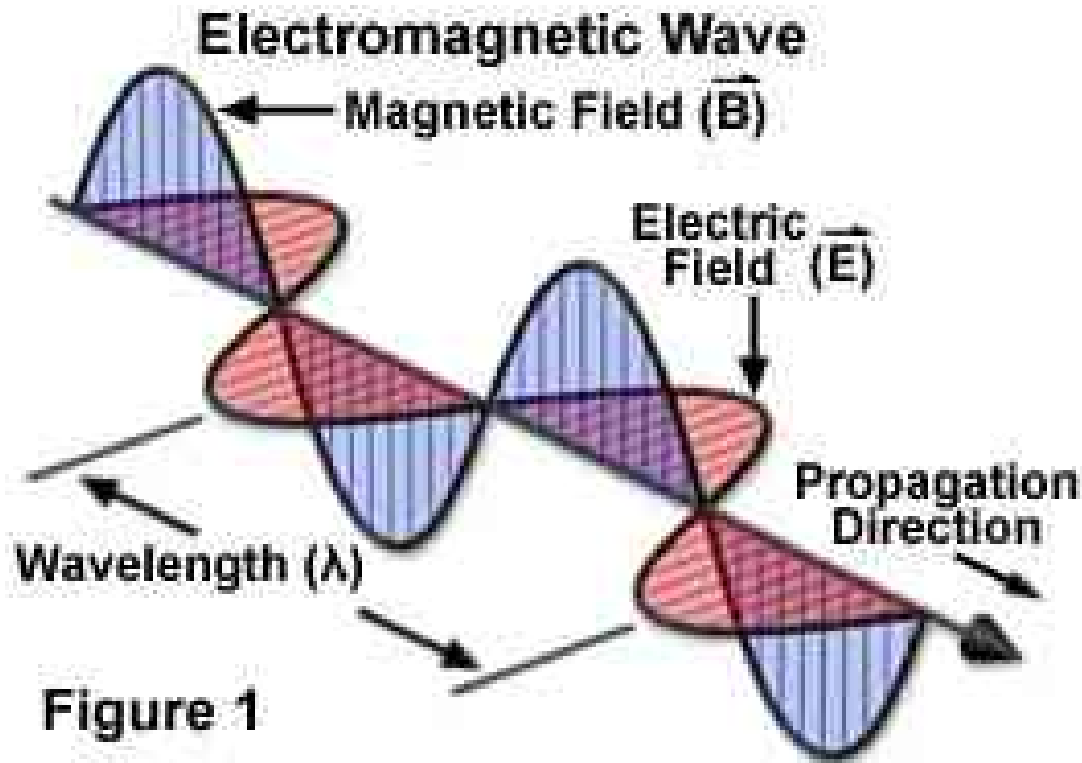


**Longitudinal Wave**

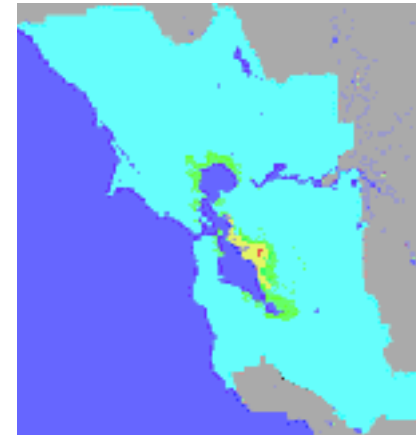
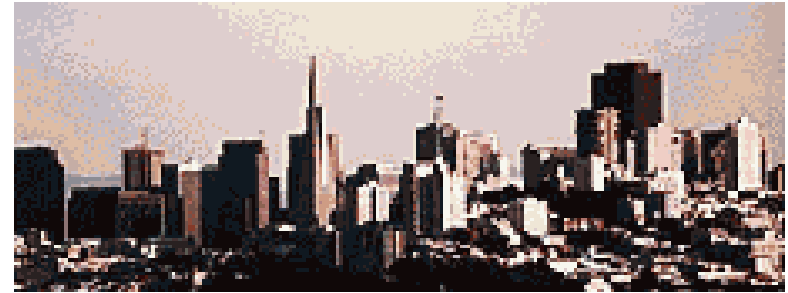
# Waves: Water



# Waves: Light

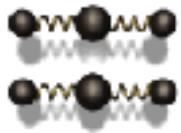


# Waves: Earthquake

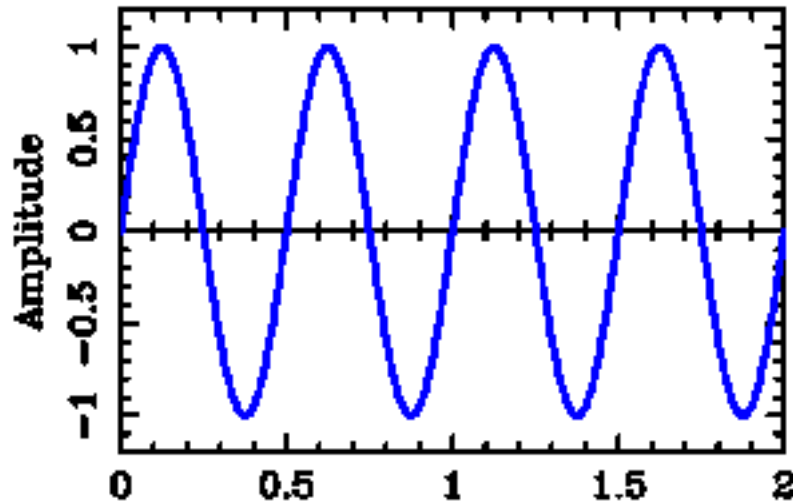


# Waves: Frequency

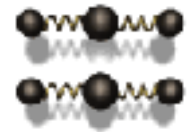
- **Frequency (F)** – The number of vibrations something makes in one second



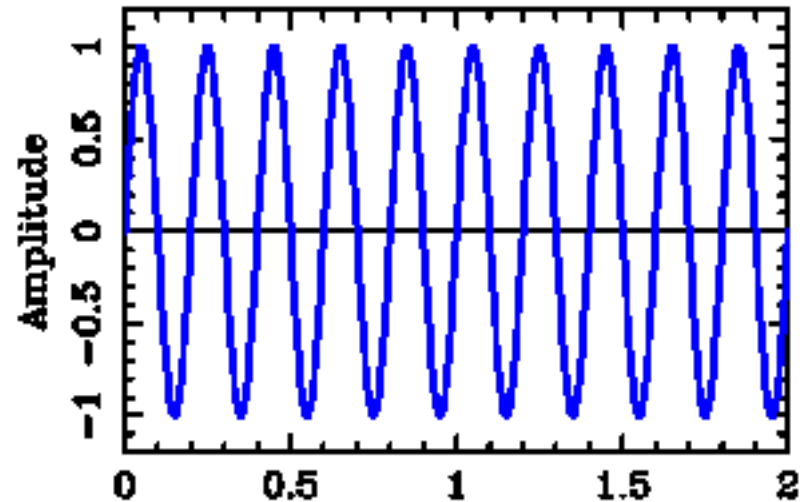
Low Frequency



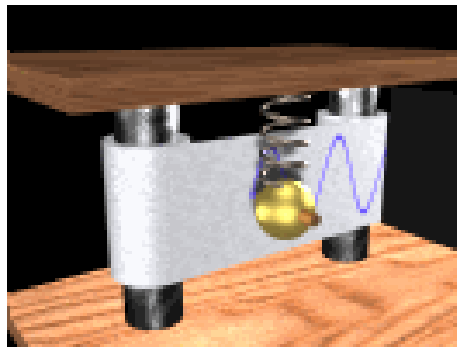
Time (seconds)



High Frequency



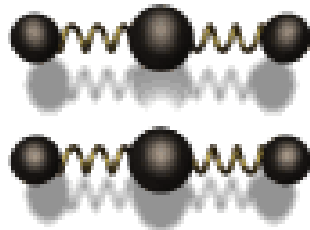
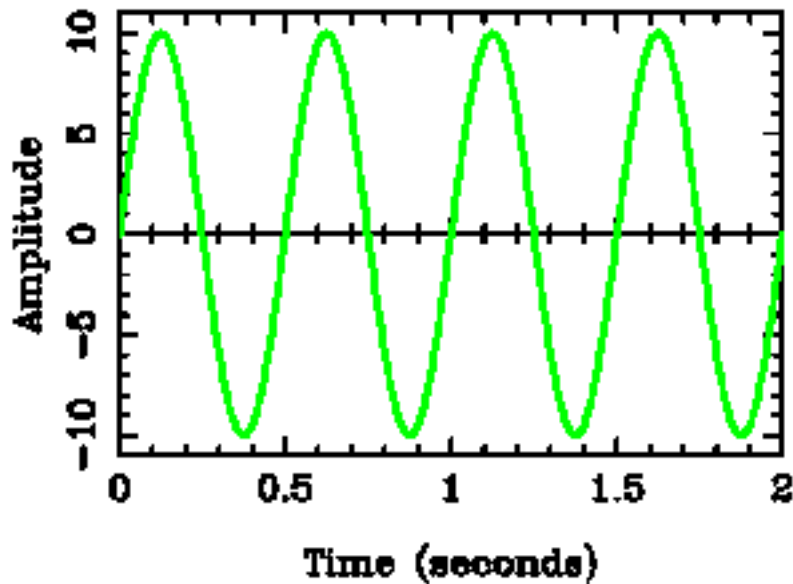
Time (seconds)



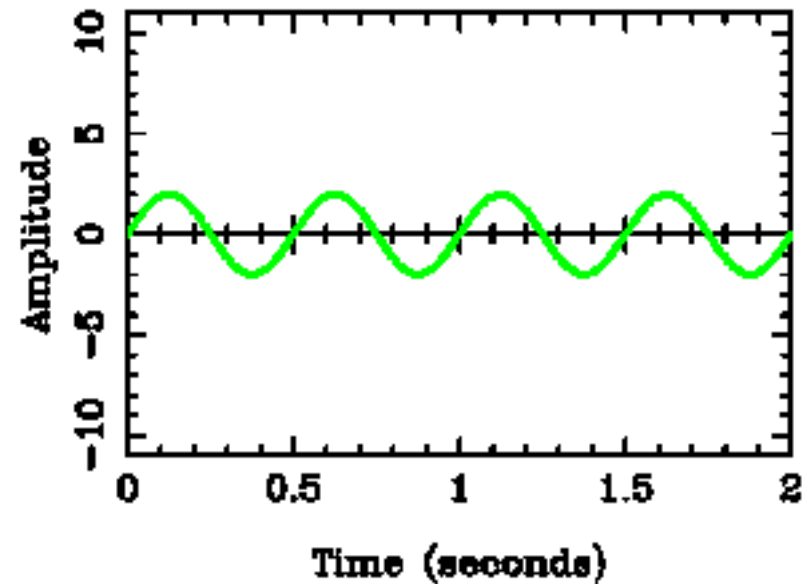
# Waves: Amplitude

- **Amplitude (A)**– The size of the vibration.

**Large Amplitude**



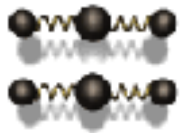
**Small Amplitude**



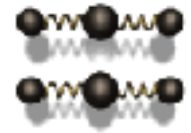


# Waves: Frequency

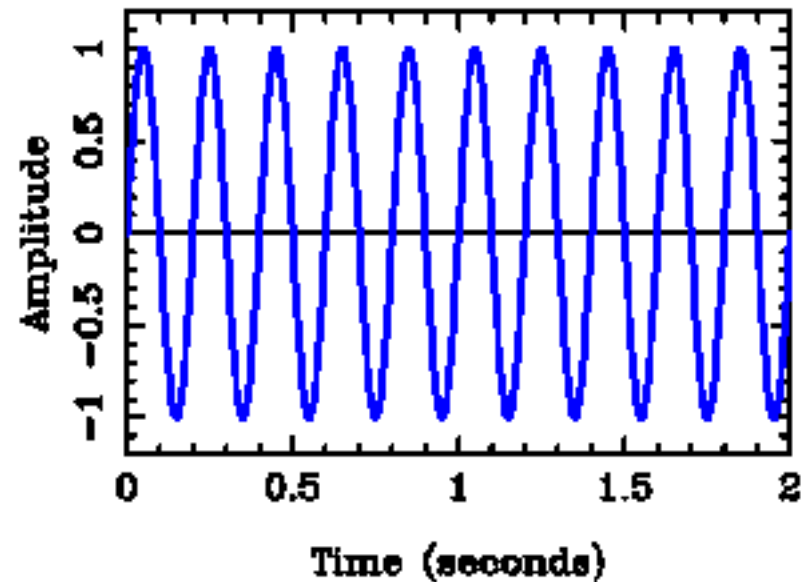
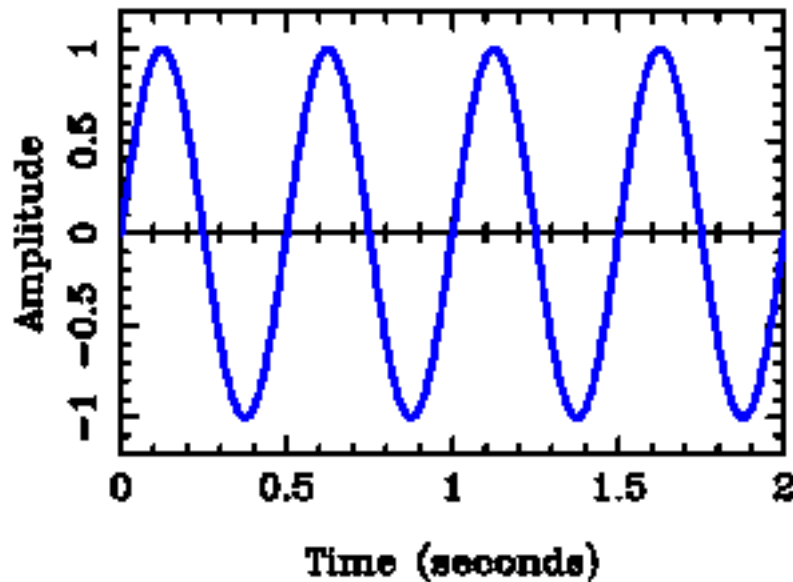
- **Frequency (F)** – The number of vibrations something makes in one second



Low Frequency



High Frequency

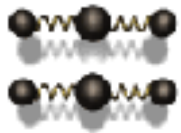


**What's the Frequency?**

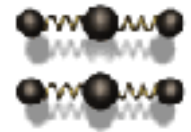
$$F = ?$$

# Waves: Frequency

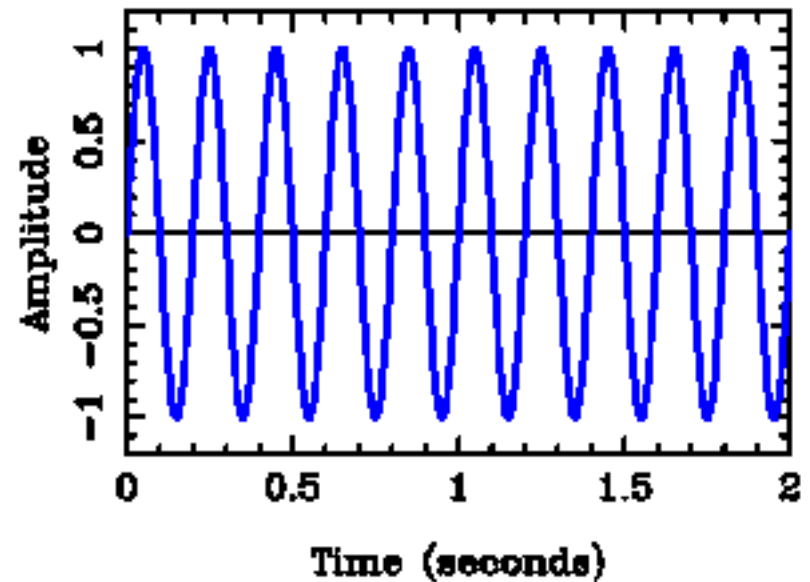
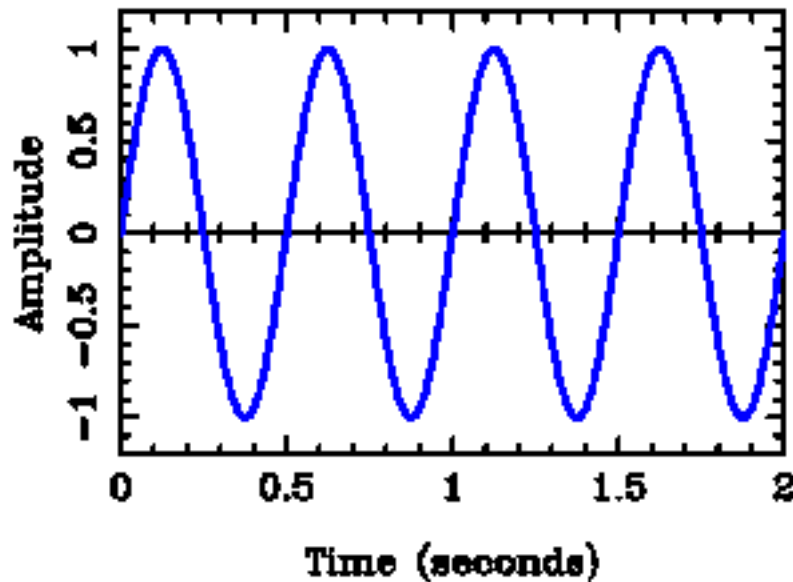
- **Frequency (F)** – The number of vibrations something makes in one second



Low Frequency



High Frequency



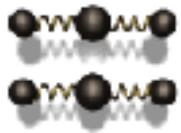
**What's the Frequency?**

$$F = V / T = 4 / 2 = 2$$

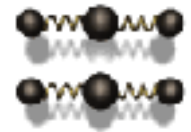
# Waves: Frequency

- **Frequency (F)** – The number of vibrations something

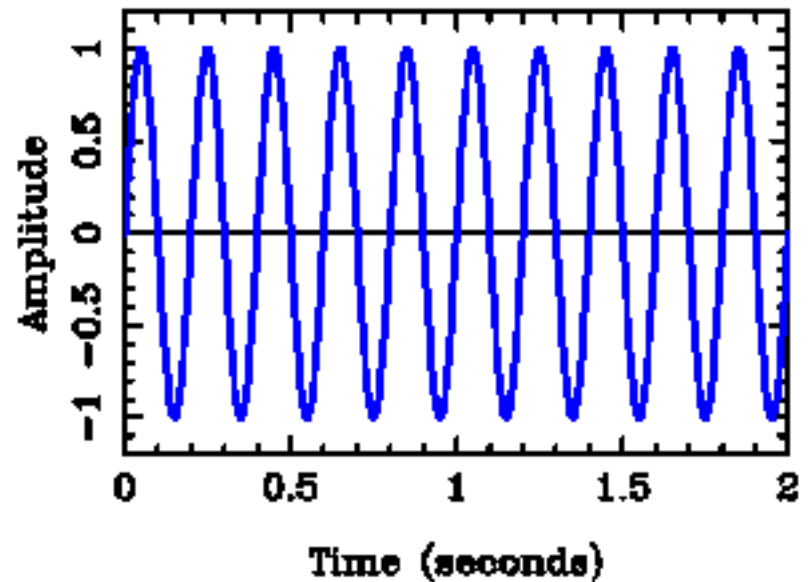
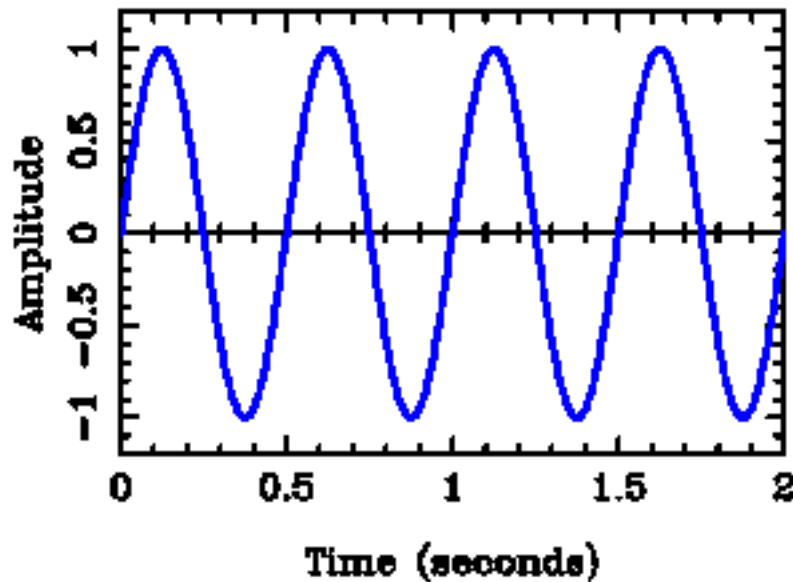
makes in one second



Low Frequency



High Frequency



**What's the Frequency?**

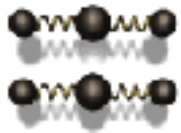
$$F = V / T = 4 / 2 = 2$$

**What's the Frequency?**

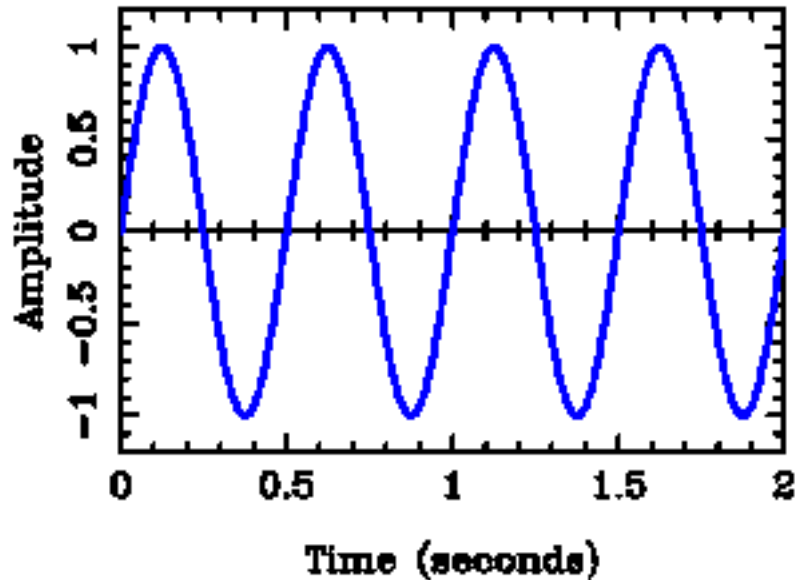
$$F = ?$$

# Waves: Frequency

- **Frequency (F)** – The number of vibrations something makes in one second

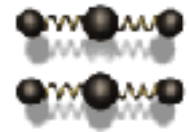


Low Frequency

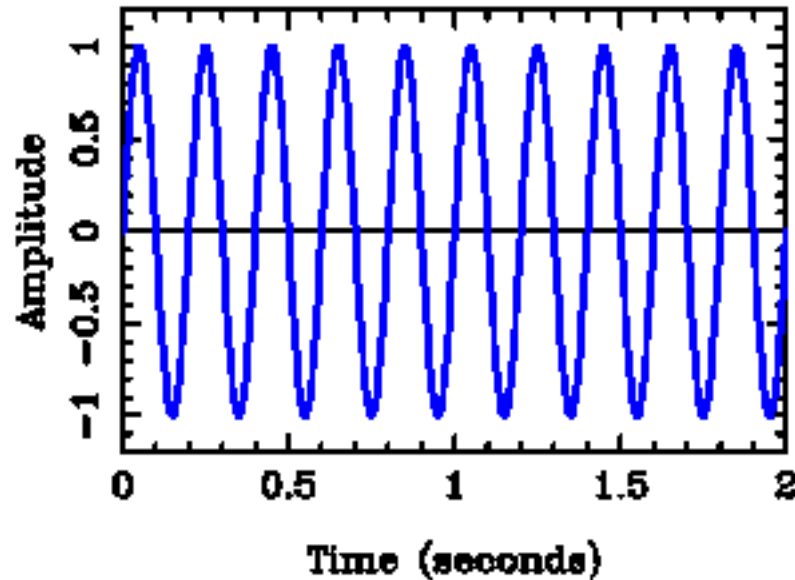


**What's the Frequency?**

$$F = V / T = 4 / 2 = 2$$



High Frequency



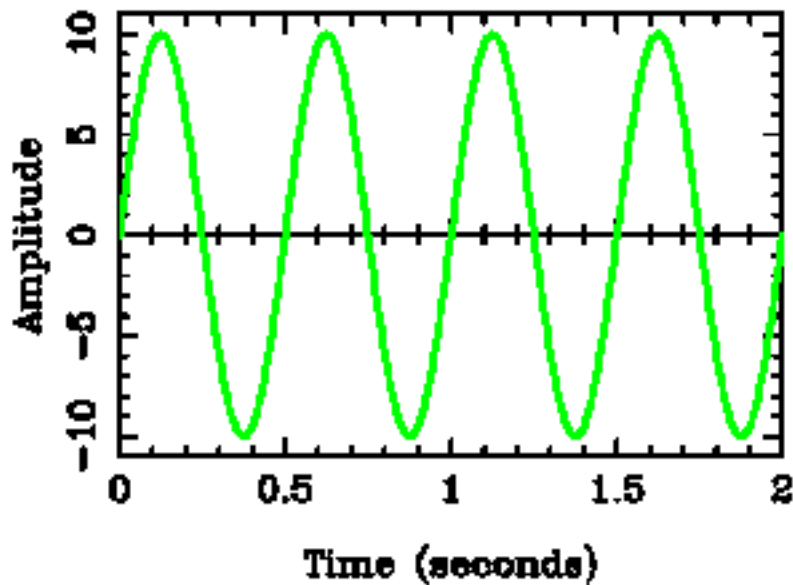
**What's the Frequency?**

$$F = V / T = 10 / 2 = 5$$

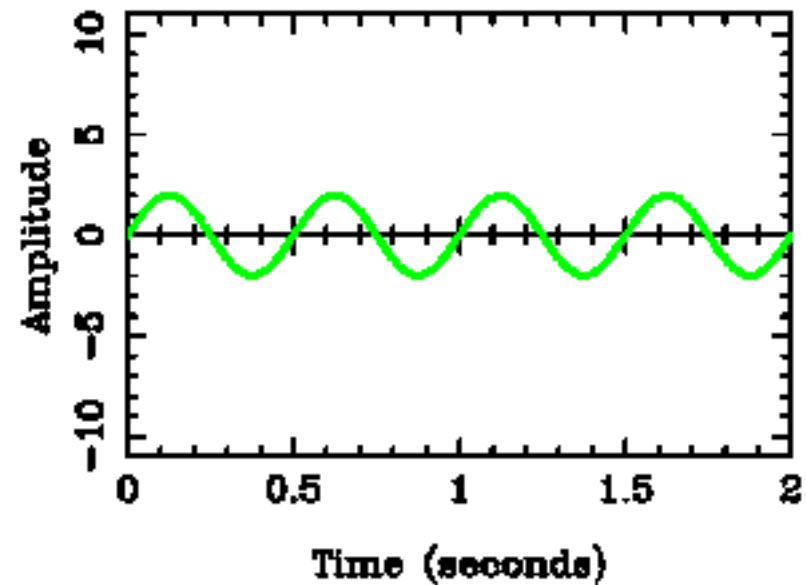
# Waves: Amplitude

- **Amplitude (A)**– The size of the vibration.

**Large Amplitude**



**Small Amplitude**



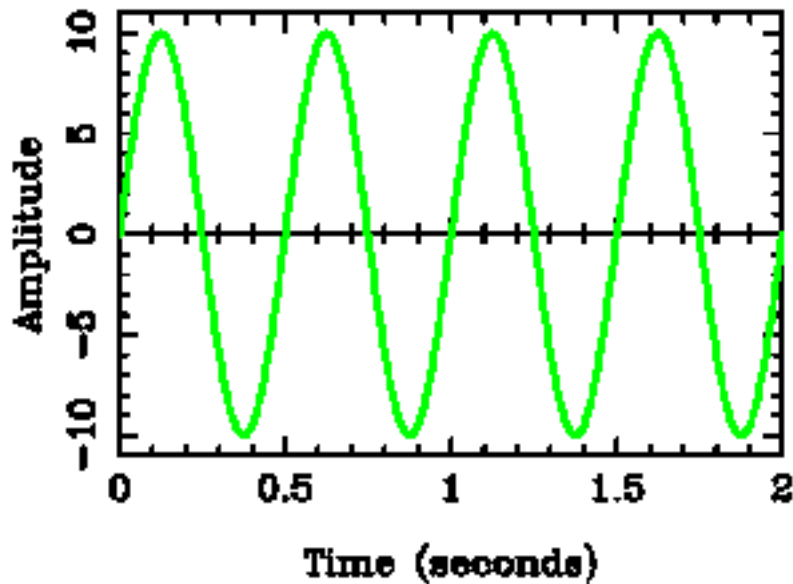
Whats the **Amplitude**?

$$A = ?$$

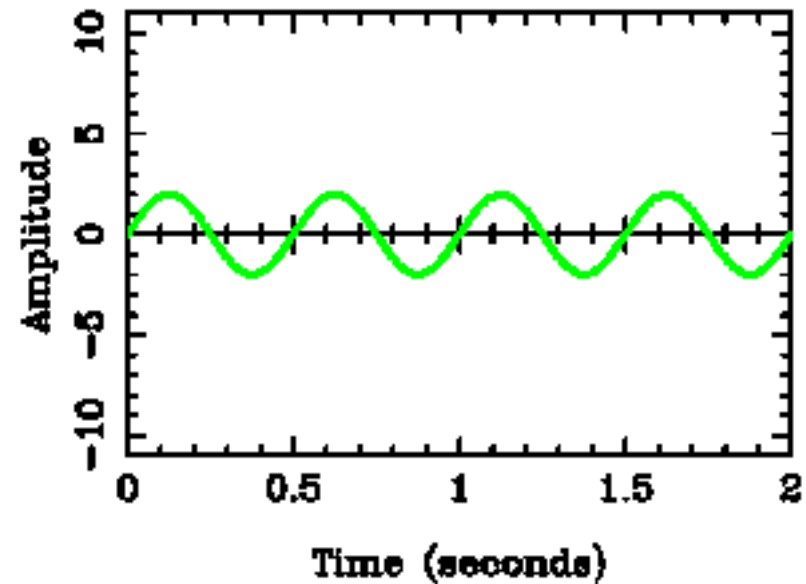
# Waves: Amplitude

- **Amplitude (A)**– The size of the vibration.

**Large Amplitude**



**Small Amplitude**



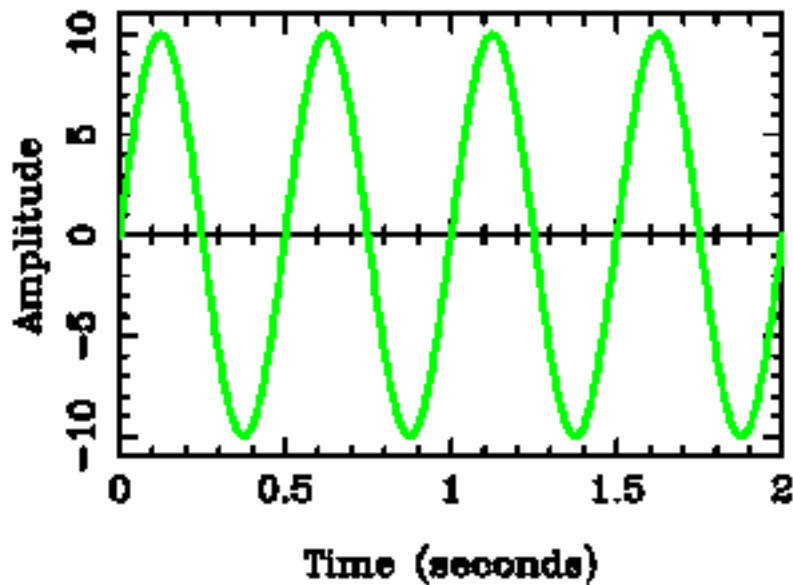
Whats the **Amplitude**?

$$A = 10$$

# Waves: Amplitude

- **Amplitude (A)**– The size of the vibration.

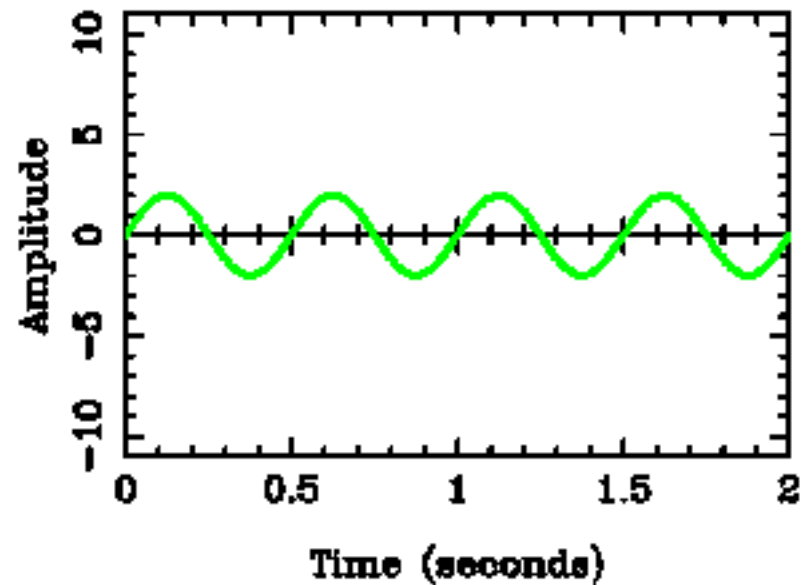
**Large Amplitude**



Whats the **Amplitude**?

$$A = 10$$

**Small Amplitude**



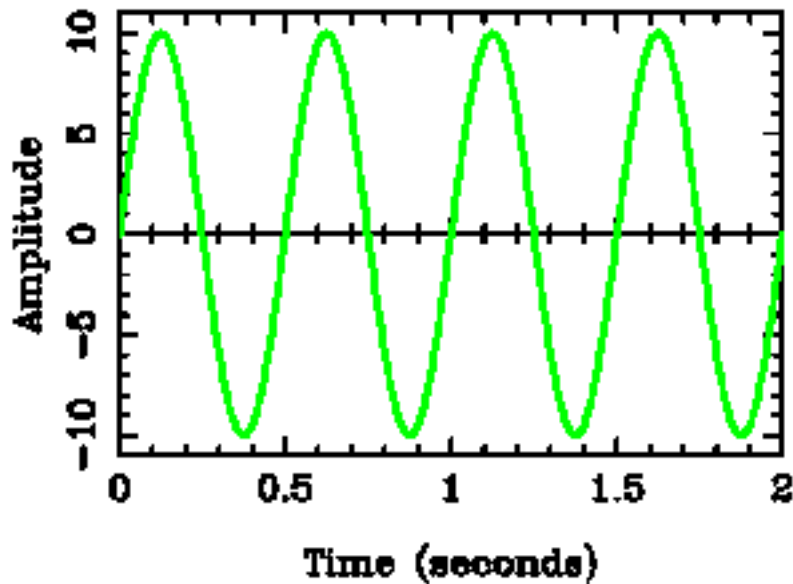
Whats the **Amplitude**?

$$A = ?$$

# Waves: Amplitude

- **Amplitude (A)**– The size of the vibration.

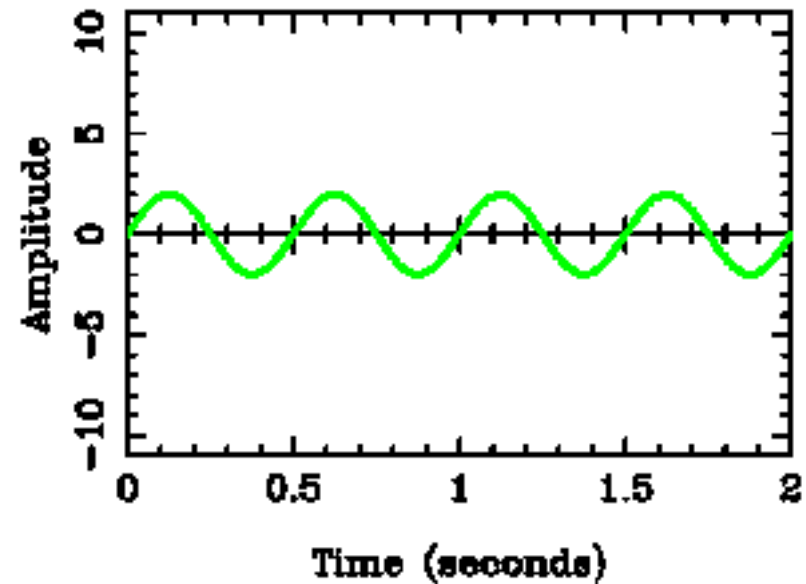
**Large Amplitude**



Whats the **Amplitude**?

$$A = 10$$

**Small Amplitude**



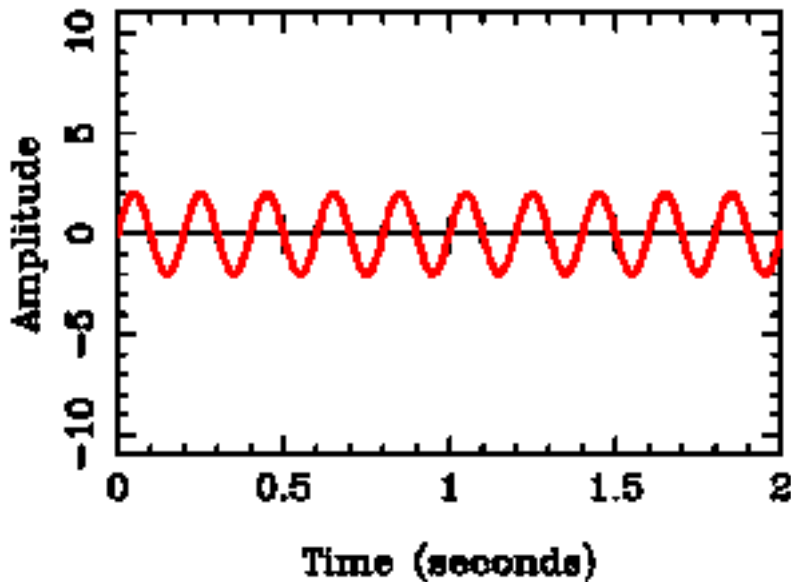
Whats the **Amplitude**?

$$A = 2$$



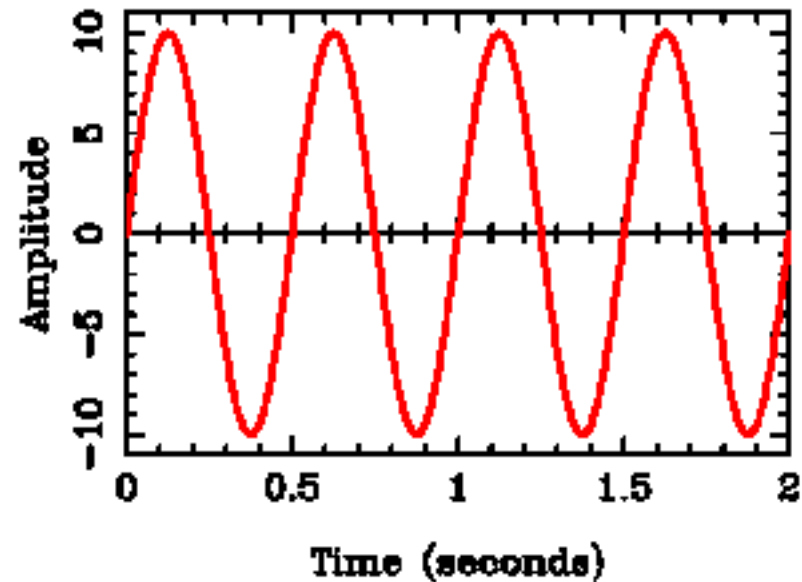
# Waves: Frequency and Amplitude

High Frequency and Small Amplitude



“Soft and High Pitch”

Low Frequency and Large Amplitude



“LOUD and Low Pitch”

# Waves: Traveling Pulse

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# Waves: Resonance

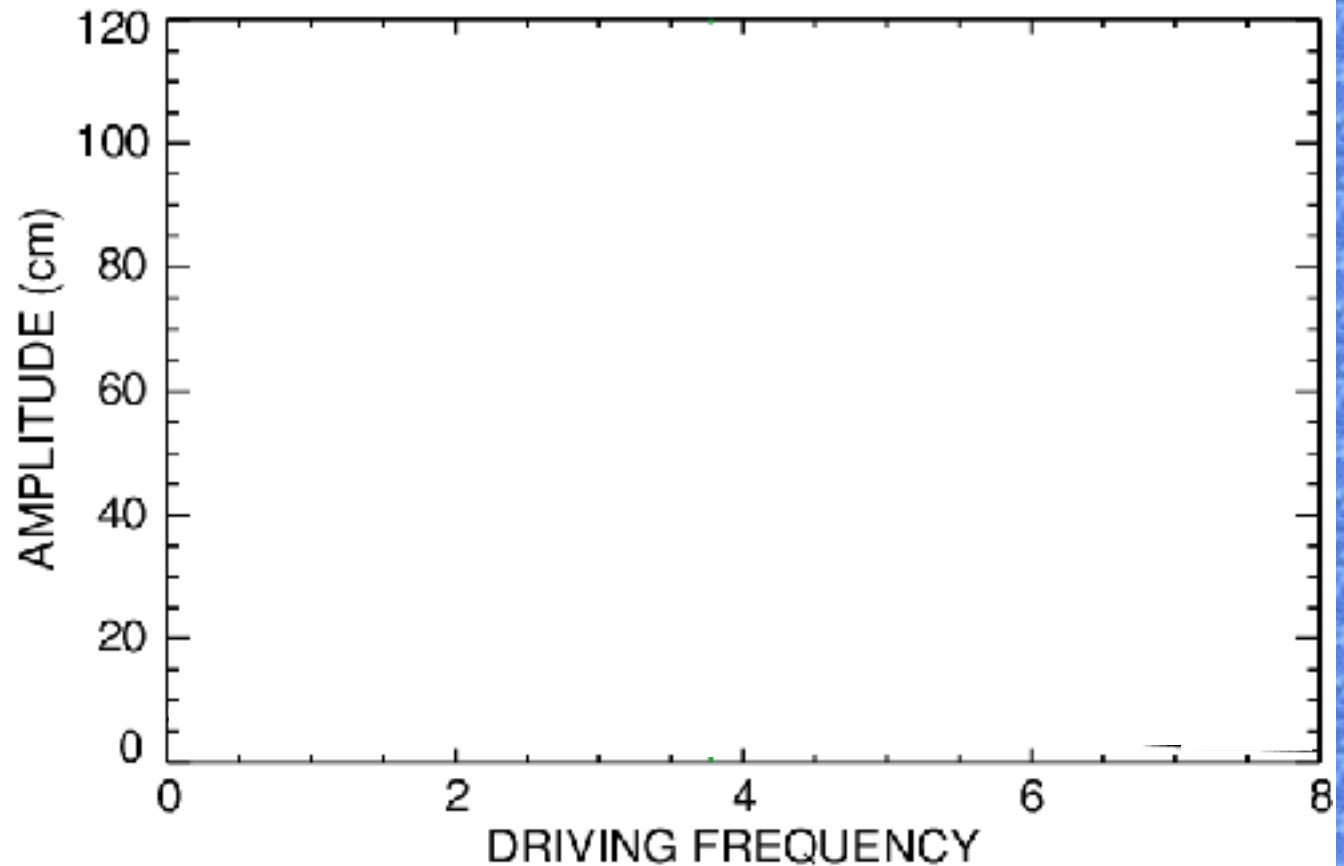
- **Resonance** – Large vibrations when something is pushed at its natural frequency



# Waves: Resonance

- **Resonance** – Large vibrations when something is pushed at its natural frequency

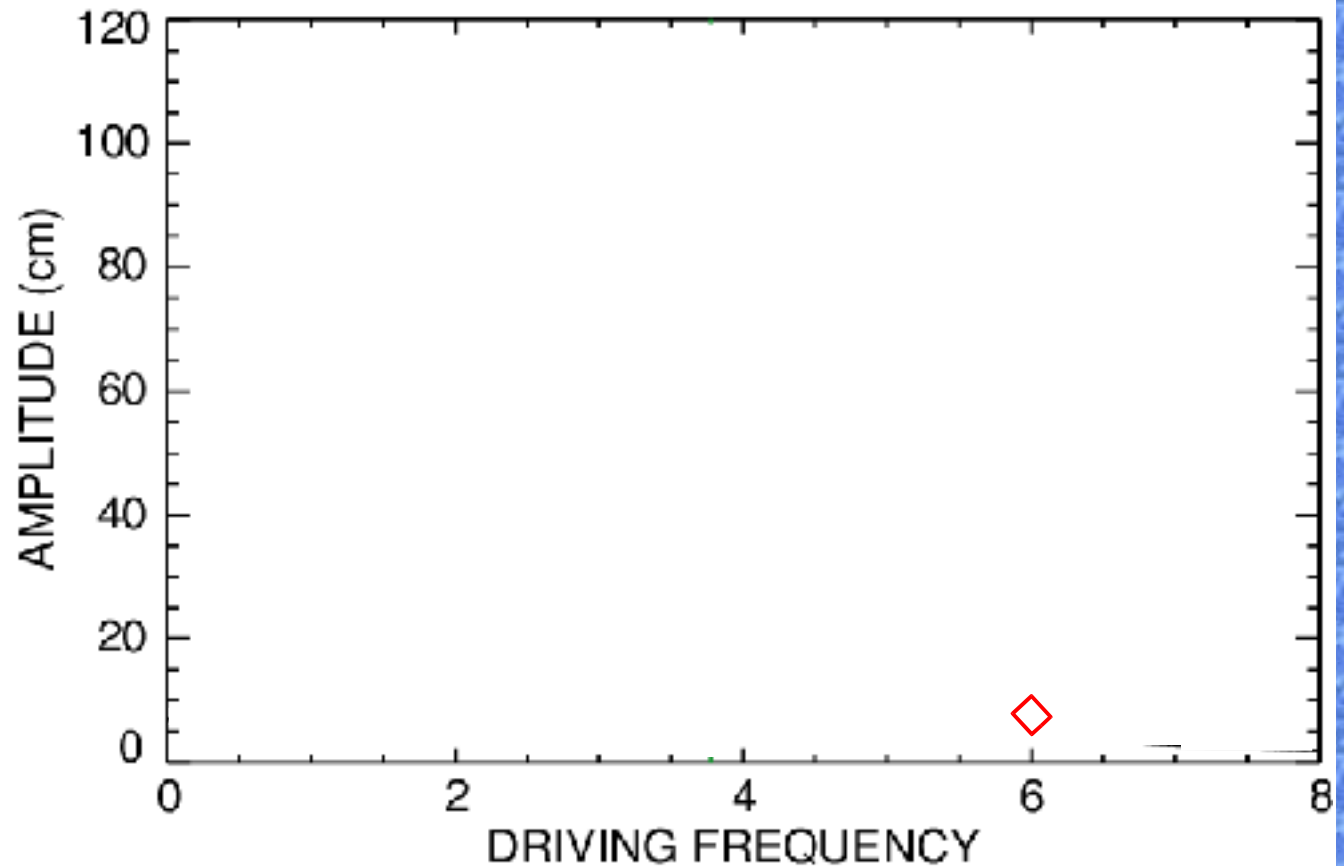
Frequency	Amplitude



# Waves: Resonance

- **Resonance** – Large vibrations when something is pushed at its natural frequency

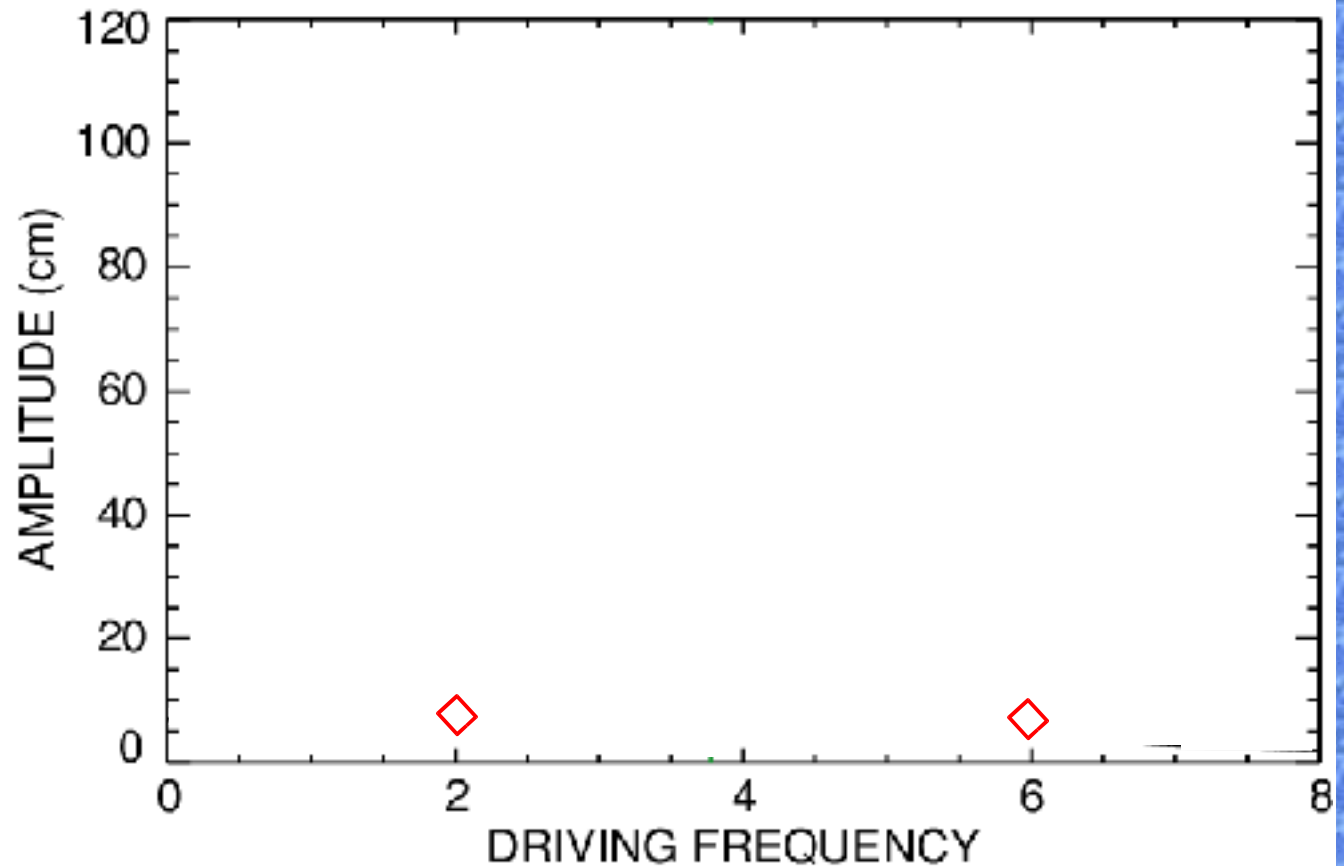
Frequency	Amplitude
6.0	8.0



# Waves: Resonance

- **Resonance** – Large vibrations when something is pushed at its natural frequency

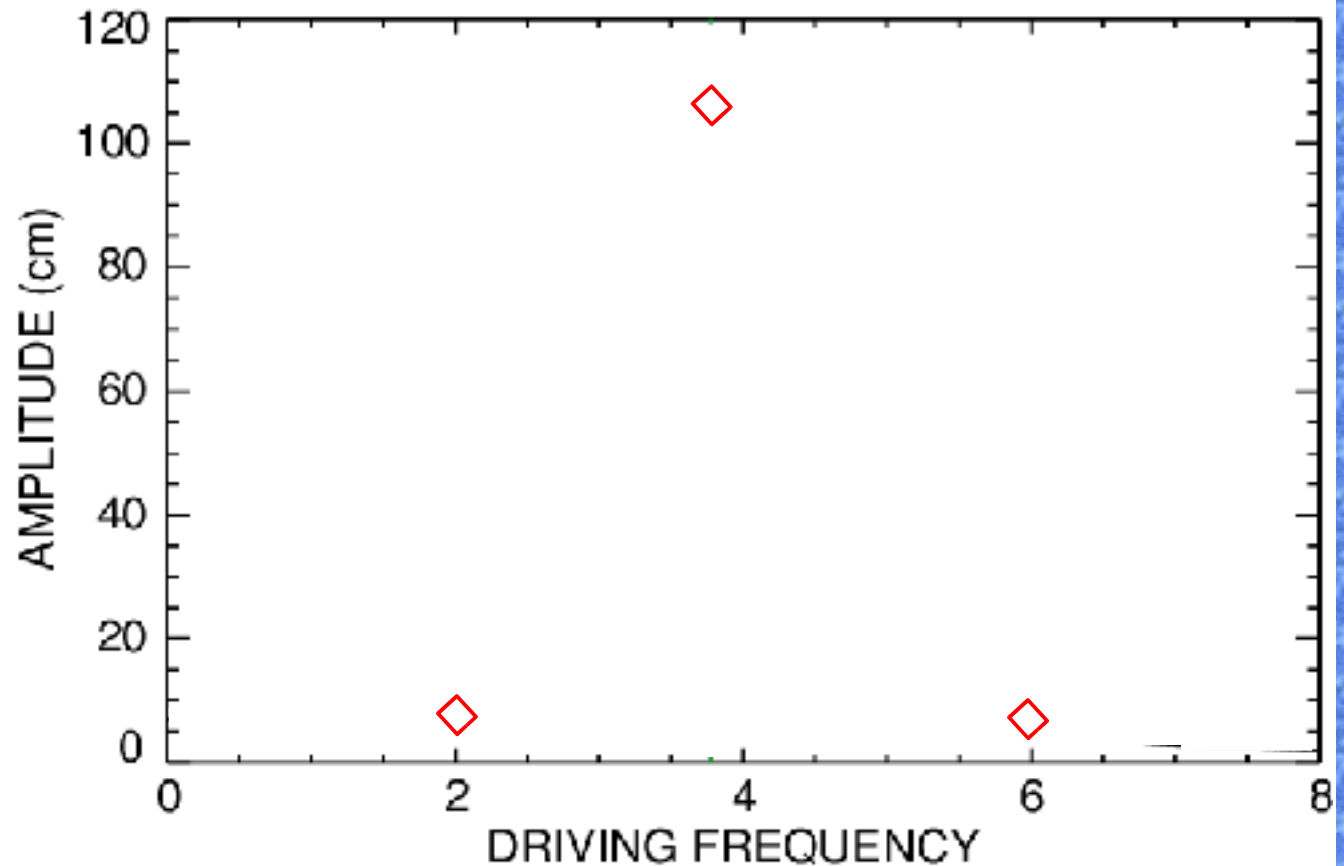
Frequency	Amplitude
6.0	8.0
2.0	8.0



# Waves: Resonance

- **Resonance** – Large vibrations when something is pushed at its natural frequency

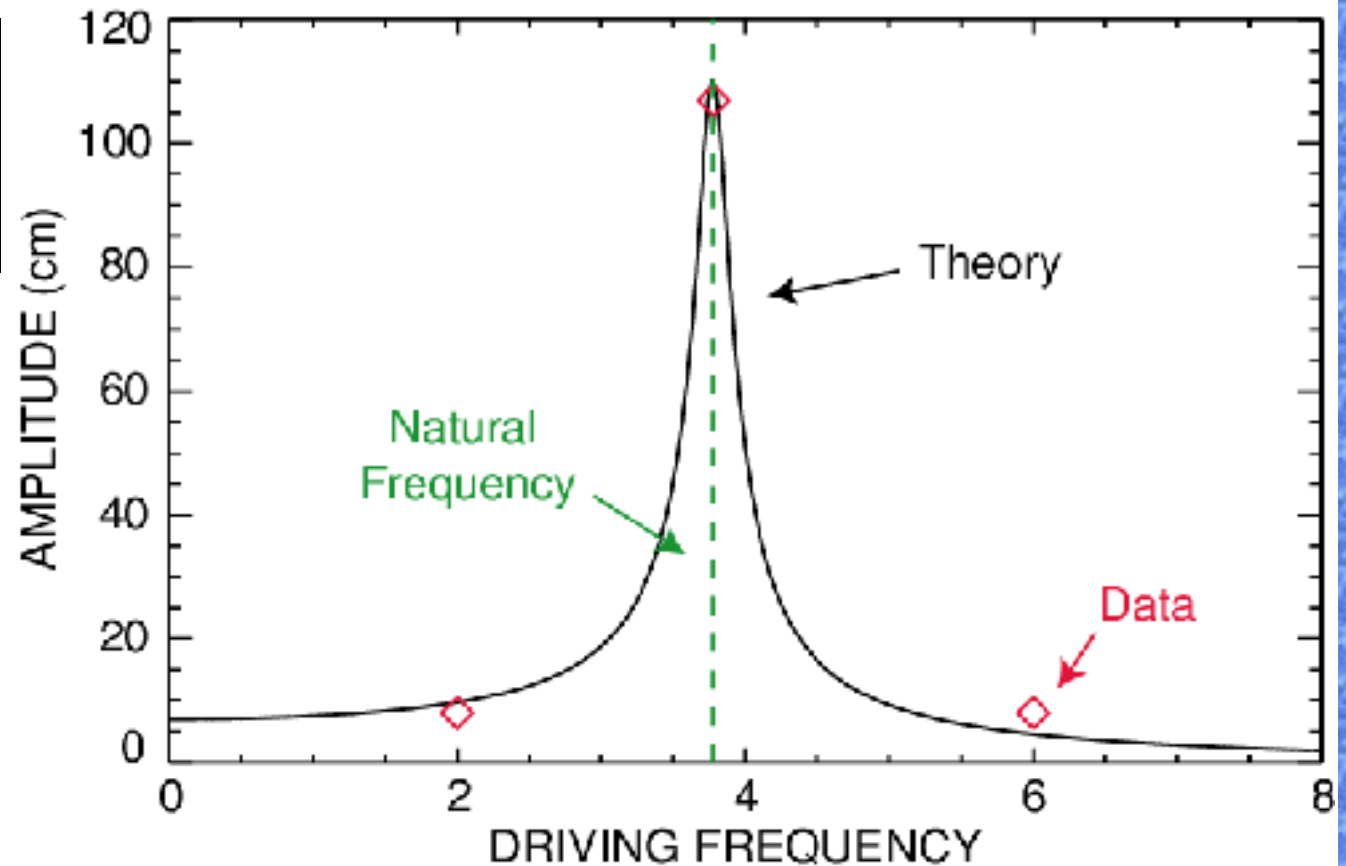
Frequency	Amplitude
6.00	8.00
2.00	8.00
3.78	107.00



# Waves: Resonance

- **Resonance** – Large vibrations when something is pushed at its natural frequency

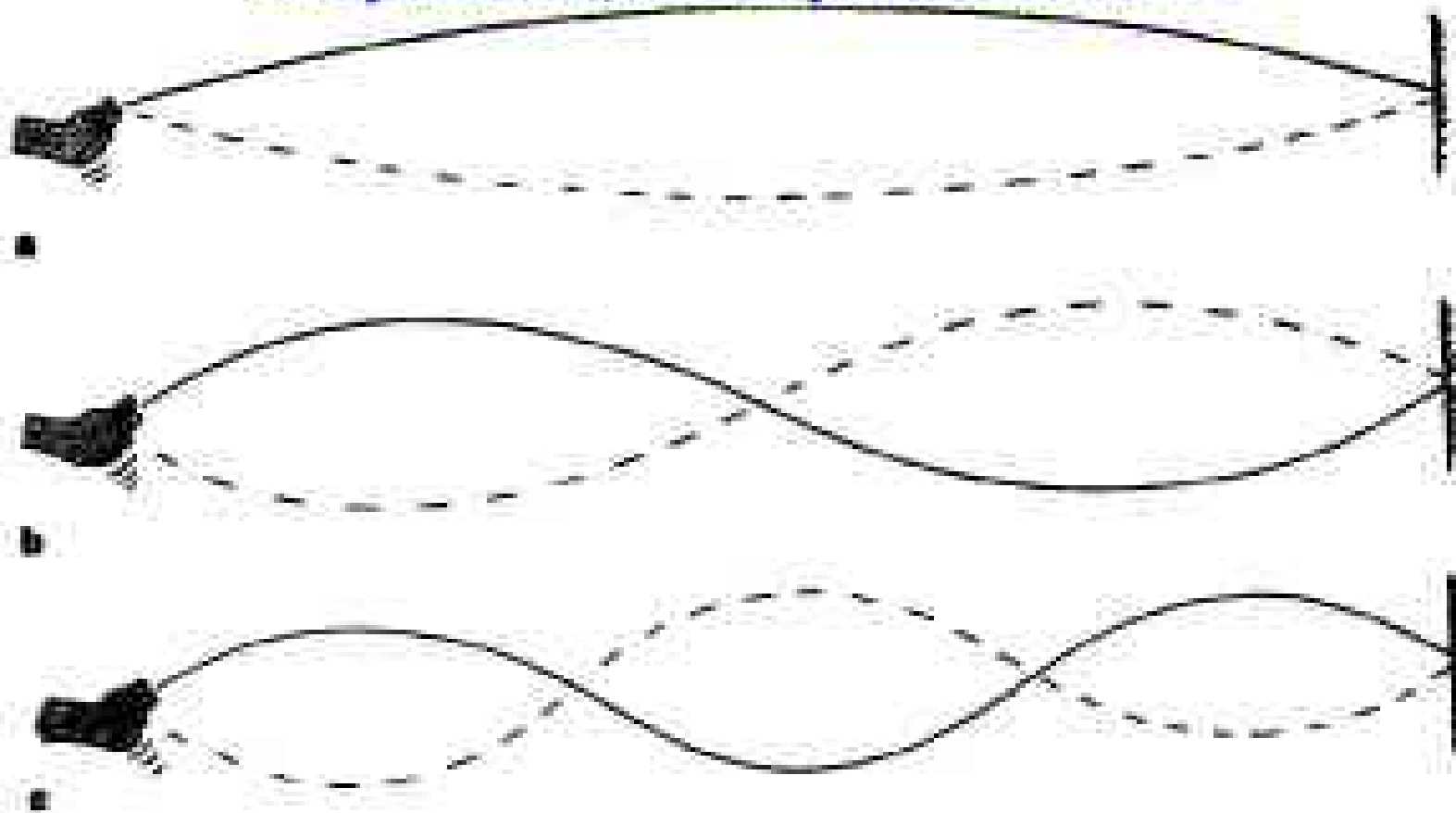
Frequency	Amplitude
6.00	8.00
2.00	8.00
3.78	107.00





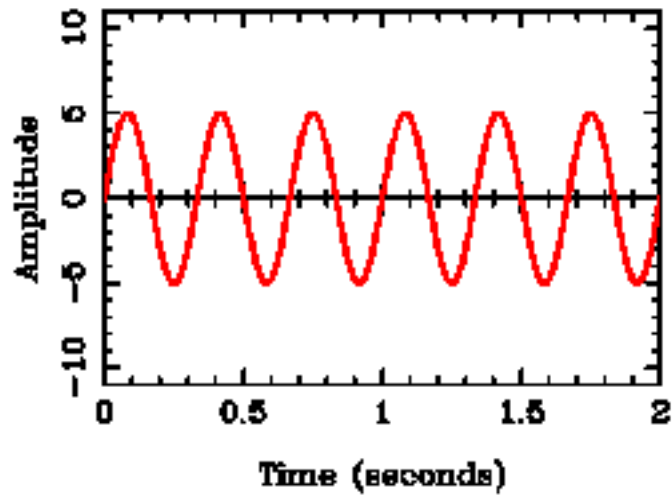
# Standing Waves

When the string vibrates at these natural frequencies, these patterns form:

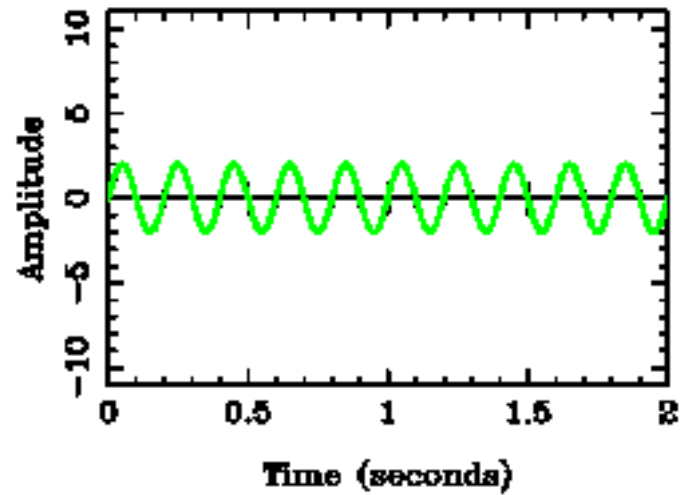


# Waves: Review

Wave A



Wave B



Wave C

