Name: ____________________

Period: ____________________

Harmonic Motion and Light Review

Key

Ch 11-15 Rev

Harmonic (H), Linear (L), or Wave (W) motion?

Person running: L____	A swing: H ________	Music: W __________
The moon: H_______	A car moving: L ____	Bird flying: L_______
Clock pendulum: H __	Jumping Jacks: L ___	Bouncing spring: H __
Ocean waves: W ____	X-rays: W_________	Radio Signals: W ____

1. Frequency – A
2. Period – C
3. Cycle –D
4. Hertz –E
5. Amplitude–B

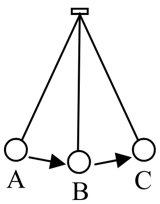
A. The number of cycles per second.

B. The size or strength of a cycle.

C. Time it takes to complete one cycle.

D. A part of motion that repeats over and over with a set series of events.

E. A unit of one cycle per second.



One cycle would be from C to *C.*

One half cycle would be from A to *C.*

The amplitude would be from C to *B*.

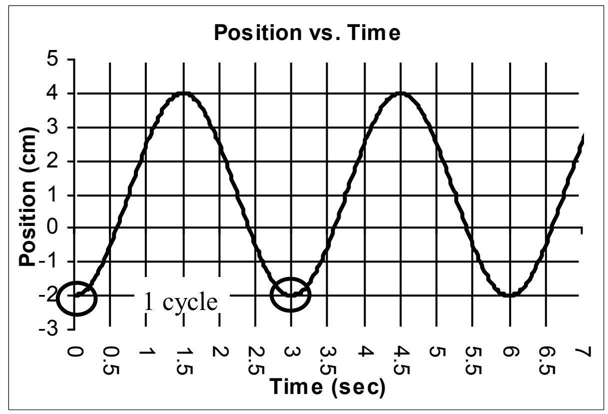
To shorten the period you would have to shorten or lengthen the string? *shorten*

If the mass at the end was greater period would be? *same*
If the amplitude was greater the period would be? *same*

If the frequency of a pendulum is 2 Hz, what is the period?
T = 1/f = 1/2 = 0.5 sec

If the period of a wave is 4 seconds, what is its frequency?

f = 1/T = 1/4 = 0.25 Hz

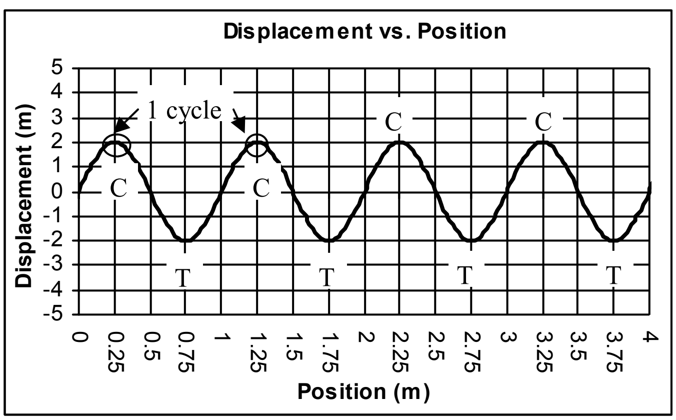


Mark 1 cycle of the harmonic motion.

Starting at 1.5 secs, when does the 1st cycle end: *4.5 sec*

Number of complete cycles: *2.5 (little less)* Period: *3 sec*

Frequency: *1/3 = 0.33 Hz* Amplitude: *1/2(4-(-2)) = 3/cm*



Mark 1 cycle of the wave. / Is it a standing or moving wave?

Mark the crests and troughs.

Starting at 0.75 m, where does the 2nd cycle end:

Number of complete cycles: *4* Wavelength: 1 m

Amplitude: 2 m If f = 4 Hz, find speed: *= fλ = 4x1 = 4m/s*

If a wave is 30 m long and 4 Hz, find its speed.
v = fλ = 4 x 30 = 120 m/s

If a 150 m/s wave has a frequency of 15 Hz, find its wavelength.

v = fλ *150/15 = λ*

150 = 15(λ) *10 m = λ*

Find its period: *T = 1/f = 1/200 = 0.005 sec*_

What harmonic is this? *2nd* _____________

Mark the nodes and anti-nodes.
How many wavelengths is it? *One*________

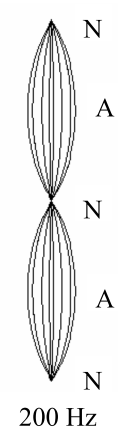
Can we hear this frequency? *yes*___________

Find the fundamental frequency:

200/2 = 100 Hz ________________________

3rd harmonic frequency:

*100 x 3 = 300 Hz*________________________



Absorption, Reflection, Refraction, or Diffraction?

Light waves hit a mirror and bounces off by: *Reflection*

You can hear around a corner by: *Diffraction*

If a wave hits a soft boundary, it dies by: *Absorptions*

A wave bends inside a clear boundary by: *Refraction*

A pillow reduces sound by: *Absorption*

Light between your fingers causes darkness by: *Diffraction*

A prism makes a rainbow by: *Refraction*

Name: ____________________

Period: ____________________

1. Transverse – C	A. Faster than 340 m/s.
2. Longitudinal– D	B. How we hear changes of frequency in sound.
3. Pitch – B	C. Light is this kind of wave, moving 90° to the linear motion.
4. Loudness – E	D. Sound is this kind of wave, with the vibrations in the same direction as the motion.
5. Supersonic – A	E. How we hear amplitude in sound.

To be twice as loud a sound has to change by: *+ 20 dB*

To be half as loud a 50 dB sound would have to become:
50 - 20 dB = 30 dB
Humans can hear frequencies between: *20 Hz and 20,000 Hz*

A sound wave has a frequency of 4 Hz. Find its wavelength.
$v = 340$ m/s (sound) $\quad 340 = 4(\lambda)$
$v = f\lambda \quad \lambda = 340/4 = 85$ m

You hear the crack of a bullwhip 3 seconds after you see it move. How far away is it? *S = 340 (you hear it); T = 3 sec*
$S = D/T \quad D = 340 \times 3 =$
$D = ST \quad D = 1020$ m

You yell into a cave and 4 seconds later you hear the echo return. How deep is the cave? *S = 340 (you yell); T = 2 sec (echo)*

$D = ST = 340 \times 2 = 680$ m

Where does light come from?
Electrons falling from high to low energy levels.

Two polarizers cancel out light if they are:
Turned 90° to each other (one vertical/ one horizontal)

Why do we see lightening and hear the thunder a few seconds later?
Light is much faster than sound

What is the speed of light? *3×10^8 m/sec (REALLY fast)*

What has more energy: Visible light or <u>X-rays</u>?

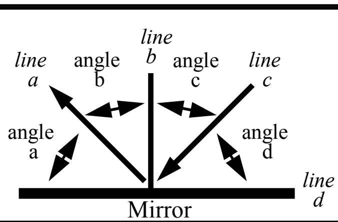
What has a shorter wavelength: Microwaves or <u>Ultraviolet</u> rays?

What has a higher frequency: Radio waves or <u>Infrared</u>?

All light, visible or invisible is part of the: *EM Spectrum*

Visible light is a big/small part of this spectrum? *Very small*

The angle of incidence is: *angle c*
The angle of reflection is: *angle b*
Line b we call the: *normal*____
The incident ray is: *line c* _____
The reflected ray is: *line b* ____



1. Radio waves—D	A. EM waves that can pass through skin and have short wavelengths.
2. Ultraviolet - E	B. Electromagnetic waves we feel as heat.
3. X-rays—A	C. Dangerous EM waves that have very high energy and come from nuclear reactions.
4. Gamma rays—C	D. EM waves that have very low energy and long wavelengths.
5. Infrared—B	E. EM waves with more energy than visible light and can cause sunburns.
6. Microwaves—F	F. Long wavelengths; used in cell phones.

Additive or Subtractive Colors and Why

Using paints: <u>*Additive*</u> _ Why? <u>*Pigments and white background*</u>

Computer screen: <u>*subtr*</u>_ Why? <u>*Uses lights; backgnd is black*</u>

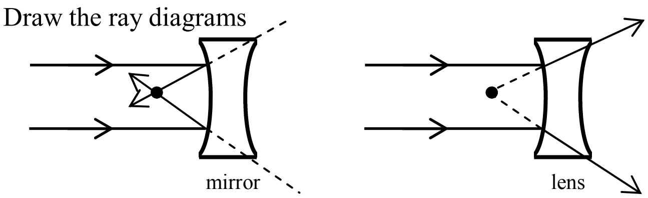
White light can be separated by a <u>*prism*</u> into these colors:
ROY G BIV:

Red	*Green*	*Blue*
Orange		*Indigo*
Yellow		*Violet*

What kind of light bulb is less efficient and why?
Incandescent—makes a lot of heat, too, not just light

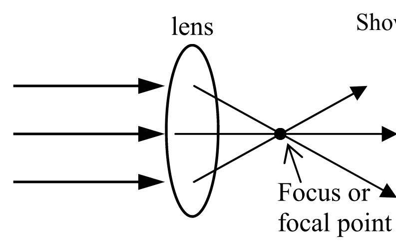
Use RGB to make these colors.		Use CMYK to make these colors.	
Black *none*	Yellow *RG*	Black *K*	Cyan *C*
Cyan *GB*	Magenta *RB*	Blue *MC*	Green *CY*
Blue *B*	White *RGB*	White *none*	Red *MY*

Draw the ray diagrams



<u>Convergent</u>/Divergent
<u>Magnifying/</u> Reducing

Convergent/<u>Divergent</u>
Magnifying/ <u>Reducing</u>



Show where the 3 light rays will go.

Concave or <u>convex</u> lens?

What do we call the dot?

<u>Magnifying</u> or reducing?

<u>Convergent</u> or divergent?

If the angle of incidence is 50°, what is the angle of reflection?
50° The angle of incidence = angle of reflection
An image looks to be 12 m away from a mirror. How far is the object? *6 m (images look twice as far away as the object)*

An object is 3 ft away from a mirror; the image looks: *6 ft*