Chapter 3

Book O

The Nature of Light

Name _____Teacher's Copy_____

Class _____

Test: ***March 25, 2014 – Next Tuesday!***

Chapter 3 –The Nature of Light Outline
Section 1-What is Light? p. 60 - 65

I. Light: An Electromagnetic Wave

*Note-An electromagnetic wave is a wave that consists of changing _electric_____ and ____magnetic_____ fields.

A. Electric and Magnetic Fields

B. How EM (Electromagnetic) Waves Are Produced

II. The Speed of Light

Note-Light travels at 300,000,000 m/s (meters per second) or 186,000 m/s (miles per second)
That's 880,000 times faster than sound waves!
Light could travel 7.5 times around the earth in 1 second.

III. Light From the Sun

*Note-The major source of energy on Earth **originates** from the ____sun_____.

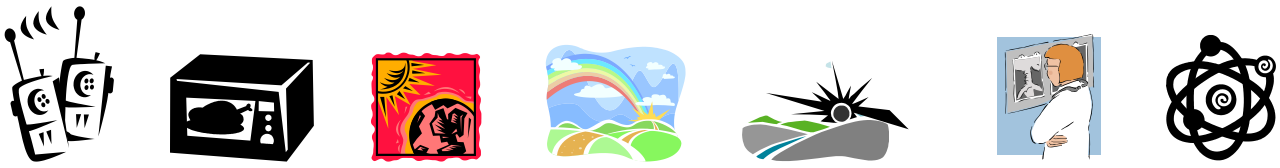
Chapter 3 –The Nature of Light Outline

Section 2-The Electromagnetic Spectrum

I. Characteristics of EM Waves

*Note-Electromagnetic (EM) waves are arranged in a chart called the Electromagnetic Spectrum by their ____wavelengths_____. The Electromagnetic Spectrum is arranged from long to short waves.

******Electromagnetic Spectrum p. 66-67******



___radio__ _microwave __Infrared__ _Visible__ _ultraviolet__ ___X rays_ __Gamma_

Heat ROY G. BIV

LEFT

low frequency
long wavelength

high frequency
short wavelength

RIGHT

"All right, I'll say Hi to my short Gramma!"

II. Radio Waves

A. Broadcasting Radio Signals
B. Comparing AM and FM Radio Waves
C. Radio Waves and Television

*Note-Radio Waves are used to broadcast _____television_____ signals.

*Radio waves have the *longest* wavelength and the *lowest* frequency.

III. Microwaves

A. Microwaves and Communication

*Note-Microwaves are used by _____cellular phones_____ to send and receive signals.

B. Radar

IV. Infrared Waves

*Note-___Infrared_____ waves make things warm.

V. Visible Light

A. Visible Light From the Sun

*Note-___Visible_____ light is white light the can come from the sun. It contains all the colors that people can see.

B. Colors of Light

Note-Name the colors of light people can see. ROY G. BIV

__red____ __orange____ ___yellow_ ___green__ ___blue___ __indigo____ __violet_____

Left side
Long wavelength
Low frequency

Right side
short wavelength
high frequency

**Say, "Hi" to my short Gramma Violet.

VI. Ultraviolet Light

A. Bad Effects

*Note-UV (Ultraviolet) light is produced by the sun and can cause a __sun burn_ or ___cancer_____.

VII. X Rays and Gamma Rays

A. X Rays

*Note-__X Rays_____ are used to see inside containers without opening them for security purposes at airports.

B. Gamma Rays

*Note-____Gamma Rays_____ are used to treat some forms of cancer.

Chapter 3 –The Nature of Light Outline
Section 3 Interactions of Light Waves p. 74 - 81

I. Reflection

*Note-___Reflection_____ is a wave interaction in which a ray of light, sound, or heat bounces off a surface that it does not go through.

A. The Law of Reflection
B. Types of Reflection
C. Light Source or Reflection?
*Note-Objects that produce their own light are called ___Luminous_____.

II. Absorption and Scattering

A. Absorption of Light
*Note-____Absorption_____ is a wave interaction in which the energy carried by light waves is transferred to particles of matter.

B. Scattering of Light
*Note-_____Scattering_____ is a wave interaction with matter that causes light to change its energy, direction of motion, or both.

III. Refraction

A. Refraction and Material
*Note-__Refraction_____ is a wave interaction in which a wave bends as it passes between two substances in which the speed of the wave differs.

B. Refraction and Optical Illusions
C. Refraction and Color Separation
*Note-When white light is refracted, the amount that the light bends depends on the light's __wavelength_____.

IV. Diffraction

*Note-_____Diffraction____ is a wave interaction in which a wave encounters an obstacle or an edge and changes direction.

A. Diffraction and Wavelength

V. Interference

A. Constructive Interference
*Note-Constructive Interference is a wave interaction that happens when two or more waves overlap and the resulting wave has a greater __amplitude_____.

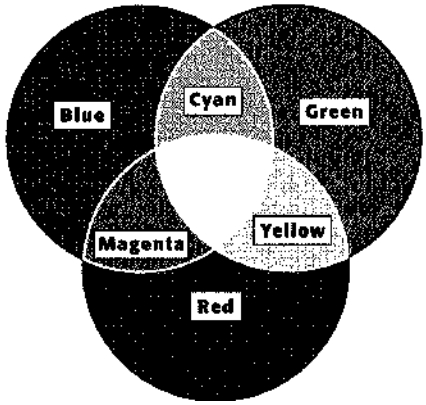
B. Destructive Interference
*Note-Destructive Interference is a wave interaction that happens when two or more waves overlap and the resulting wave has a smaller ____amplitude_____.

Chapter 3 –The Nature of Light Outline
Section 4-Light and Color

I. Light and Matter
   A. Types of Matter
   1. Transparent
   2. Translucent
   3. Opaque

II. Colors of Objects
   A. Colors of Opaque Objects
   *Note-The color of an opaque object is determined by the color that is _____reflected_____.
   B. Colors of Transparent and Translucent Objects
   *Note-The color of a *trans*parent object depends on the color of light that is _____*trans*mitted_____.

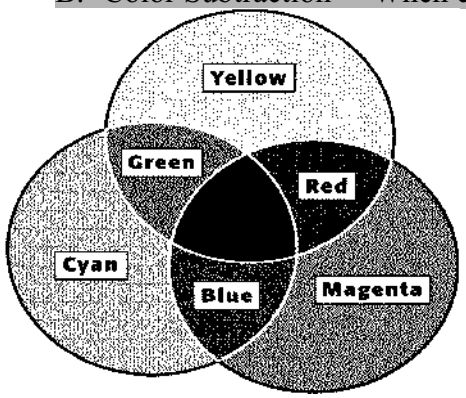
III. Mixing Colors of Light
   A. Color Addition -- "When the center is WHITE, you're adding LIGHT".



*Note-Primary colors of light combine to produce white light. This is ___Color _____Addition_____.

   B. Light and Color Television

IV. Mixing Colors of Pigment
   A. Pigments and Color
   B. Color Subtraction- "When colors subtract, you're left with BLACK."



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