

Grade 8 Science: Unit 3-Optics

Chapter 4: Properties of Light

- *Key Terms: Microscope, telescope, amplitude, crest, energy, force, frequency, hertz, medium, transverse wave, trough, wave, wavelength, reflection, refraction, spectrum, visible light, wave model of light, electromagnetic radiation, gamma rays, infrared waves, microwaves, radiant energy, radio waves, ultraviolet waves, X rays,*

There are many types of light sources...

- _____
- _____
- _____
- _____
- _____
- _____

The Nature of Light

-
- ⊙ A Greek philosopher _____
 - ⊙ Believed light was _____
 - ⊙ The eyes could detect these particles and see the object.

The Speed of Light

-
- ⊙ Tried to measure the speed of light using 2 lanterns 1 km apart.
 - ⊙ Why didn't this work?

-
- ⊙ First to measure the _____

- ⊙ Shone a light on a rotating _____ that reflected to a distant _____.

- ⊙ Used the distance and reflection time to calculate _____.

- ⊙ *At this speed it can go around the world _____ times in one second!!!*

Speed: Light vs. Sound

- **Light:** _____
- **Sound:** _____

Example: _____

Light Technologies Include...

- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____
- ⊙ _____

The microscope

- ⊙ People knew _____ glass could _____ objects
- ⊙ Father and son experimented with lenses in sliding tubes. When the tubes slide, objects appear _____.

The telescope

- ⊙ Developed by _____
- ⊙ Made his own _____ to _____ objects in space.

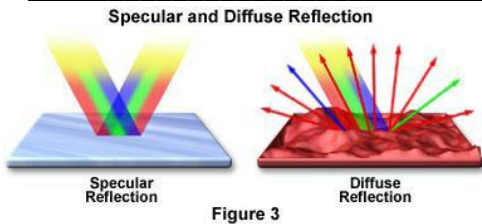
Do questions 1-13 on page 137

Visible light: _____

Properties of light

1. _____

2. _____

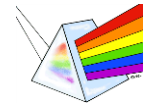


- a) _____: reflection from a mirror-like surface, which produces an _____ of the surroundings. (ex: mirrors)
- b) _____: reflection from a _____ surface, which _____ produce a clear image but does let you see what is on the surface. (ex: dust)

3. _____: light _____ when travelling through different materials.



4. _____: Example: White light separates into the colours of the rainbow when shone through a prism



5. _____: does not require a medium; no particles are involved. Example: Light from the sun and stars

6. _____

Example: window pane (transparent), frosted window (translucent), wall (opaque)

Visible Light Spectrum

- ⊙ A form of _____ our eyes can detect
- ⊙ Can be seen due to the _____ through a prism.

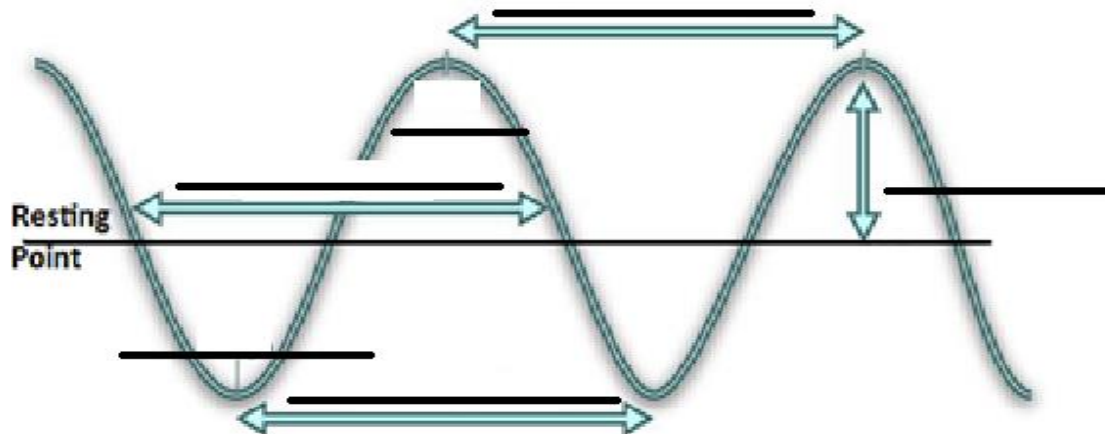
The constituent colors of white light are: _____, _____, _____, _____, _____.

Since each colour _____ differently, we can see all the colours that make up light when a beam of white light is _____ through a prism.

- ⊙ The colour we see is the colour that is being _____. All other wavelengths are _____.
- ⊙ Example: a red shirt is _____ all colours except for red. Red wavelengths are being _____.

On page 155, do questions 2-7; On page 187, do questions 1, 4, 5, and 6.

Light travels in the form of a wave



-
- ⊙ _____
 - ⊙ The _____ the frequency, the _____ the wave.
 - ⊙ Frequency = _____
 - ⊙ Measured in _____

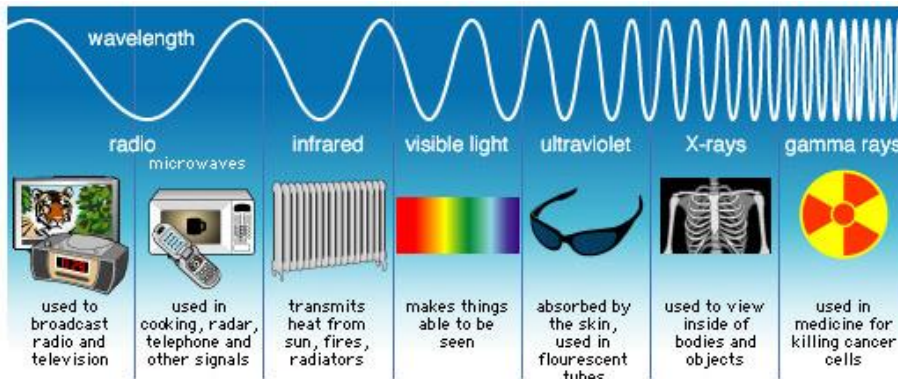
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- ⊙ The distance from _____ or _____
_____ in a wave.
 - ⊙ Longer wavelengths _____ the least (red light)
 - ⊙ Shorter wavelengths _____ the most (blue light)

-
- ⊙ High frequency waves have _____ wavelengths (blue light)
 - ⊙ Low frequency waves have _____ wavelengths (red light)

P. 147, #s 1, 2, 4, 5, 8, 9; P. 155, #s 9, 10, 13

Electromagnetic Radiation

⊙ _____



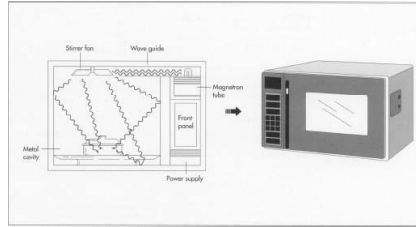
Types of Electromagnetic Radiation

1. _____
 - _____ (several kilometres to one millimetre)
 - _____
 - _____
 - Uses: MRI, Radio and television broadcasting, Microwaves, Radar

2. _____
 - Type of _____ wave that is the shortest wavelength (between one millimetre and one meter) and highest frequency.
 - Examples:
 1. Microwave ovens
 2. Telecommunications
 3. Radar (remote sensing)

How a microwave works

- ⊙ Microwave ovens use a specific frequency that is strongly absorbed by water molecules in food.



3. _____: Compared to visible light:
- _____ (between 700 and 300 000 nanometres)
 - _____
 - _____
- ⊙ Also called heat radiation
 - ⊙ Ex. Motion sensors [Predator](#)

4. _____
- Can be detected by our eyes
 - Wavelengths are between 400 (violet light) and 700 (red light) nanometres.

5. _____
- Compared to visible light:
- ⊙ _____ wavelength (between 10 and 400 nm)
 - ⊙ _____ energy
 - ⊙ _____ frequency
 - ⊙ Ex. Sun tanning
 - > Your Body uses UV light to make vitamin D, but too much can cause skin cancer.

6. _____
- Compared to visible light:
- ⊙ _____ wavelength
 - ⊙ _____ energy
 - ⊙ _____ frequency
 - ⊙ Ex. Medical uses

7. _____
- ⊙ _____ wavelength
 - ⊙ _____ energy
 - ⊙ _____ frequency
 - ⊙ Result from nuclear reactions
 - ⊙ Used to kill cancer cells

In order of:

Compare the Different Types of Electromagnetic Radiation

Complete the following table comparing the different types of electromagnetic radiation (copy it into your notebook). Use your notes to help you.

Type of Electromagnetic Radiation	Radio Waves	Microwaves (radio waves)	Infrared Waves	Visible Light	UV Waves	X-Rays	Gamma Rays
Wavelength							
Energy							
Frequency							
Example							

Is electromagnetic radiation dangerous?

- Ⓒ _____ energy electromagnetic radiation (gamma rays) is more harmful than _____ energy (radio waves).
- Ⓒ The atmosphere protects us by reflecting _____ energy radiation

Type of Radiation	Positive effects	Negative effects
Radio Waves		
X-rays		
Ultraviolet rays		
Gamma rays		

Do questions 1-12 on page 167