

Visible light has certain characteristics and behaves in predictable ways. Key concepts:

- visible light is radiant energy that moves in transverse waves;
- the visible spectrum includes light with different wavelengths;
- matter influences the path of light; and
- radiant energy can be transformed into thermal, mechanical, and electrical energy.

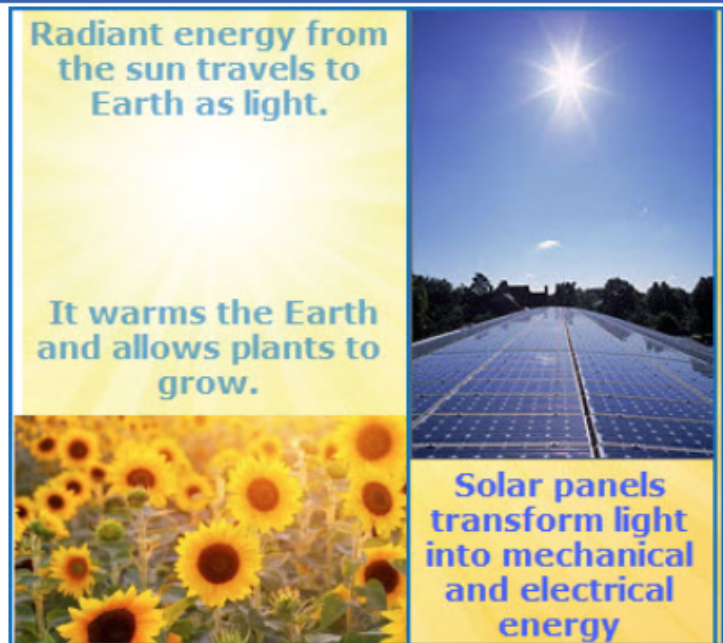
Central Idea: Visible light is a form of radiant energy that can be seen and can interact in different ways when it contacts an object.

RADIANT ENERGY TO LIGHT

Energy may take different forms, including **radiant energy**.

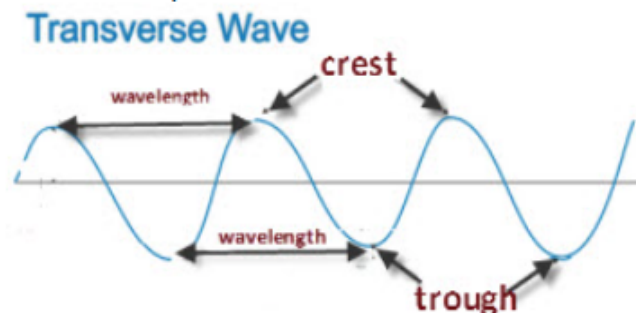
Radiant energy that can be seen by the human eye is called **visible light**.

- The **sun** produces **radiant** energy.
 - Many types of radiant energy **cannot be seen**.
- Light **transfers** radiant energy.
 - For example, **energy radiated** from the sun is transferred to Earth by **light**.
 - When this light is **absorbed**, it **warms** Earth's land, air, and water and facilitates **plant growth** through the process of **photosynthesis**.
- Current technology also **transforms** light energy into **mechanical** and **electrical** energy;
 - an example of this is the use of **solar panels** to produce **electrical power**.

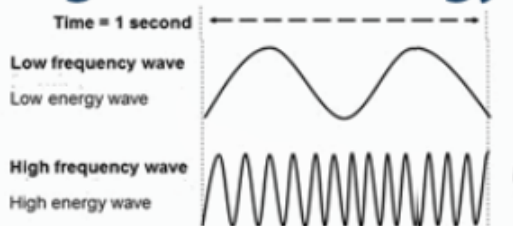


WAVELENGTH & FREQUENCY

- Light travels in **transverse waves** and does **not** need a **medium** through which to move.
- Light waves are characterized by their **wavelengths**. A **wavelength** is the distance between any two corresponding points on successive waves (usually **crest-to-crest** or **trough-to-trough**).
- The **wavelength** can be measured from any point on a wave provided it is measured to the same point on the next wave.

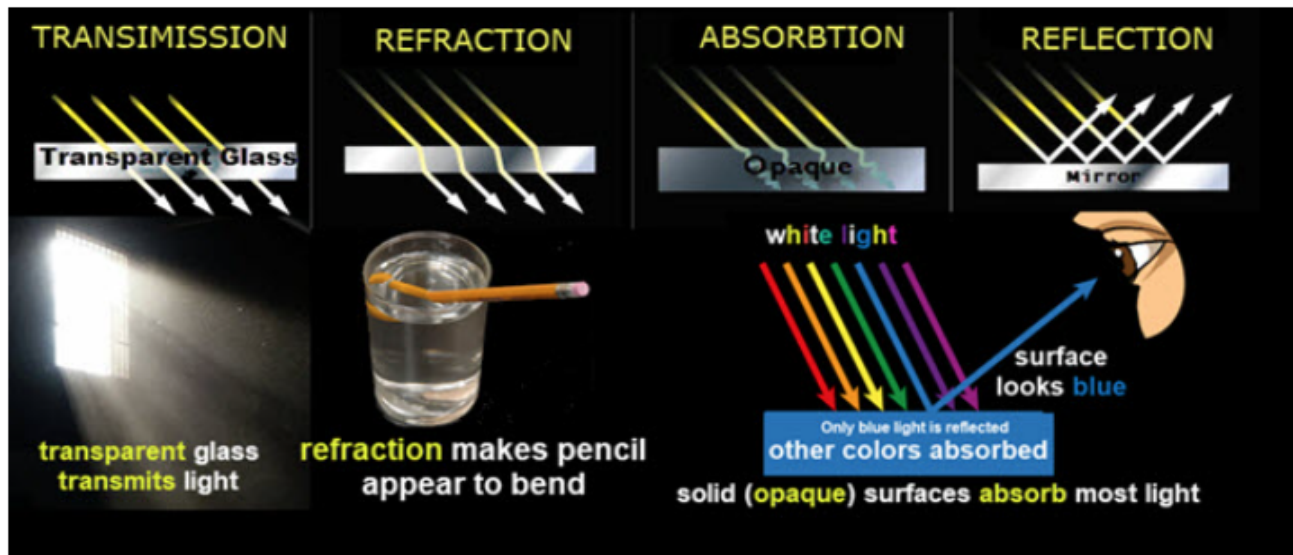
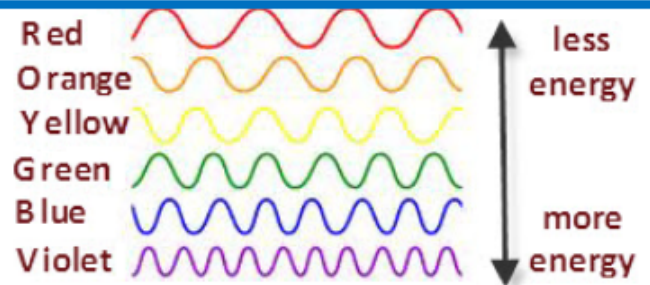


Light Wave Energy



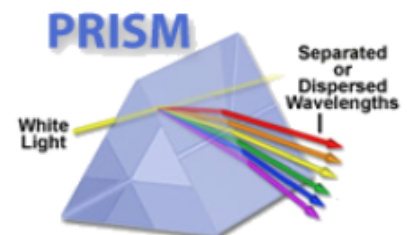
- Frequency** is the number of waves passing a given point in a designated time. The **greater** the **frequency**, the **greater** the amount of **energy**.

- The **visible spectrum** has a range of **colors** that are determined by **wavelength**.
 - The colors of the spectrum from the longest wavelength to the **shortest wavelength** are red, orange, yellow, green, blue, and violet (**ROYGBV**).
 - The **sum** of these colors is **white light**



REFLECTING, REFRACTING, TRANSMITTING, ABSORBING LIGHT

- Light travels in **straight paths** until it hits an object, where it is **reflected**, **refracted**, **transmitted**, and/or **absorbed**.
- Examples of **refraction**, or bending of waves, include
 - refraction causing a setting sun to look flat
 - a spoon appearing to **bend** when immersed in a cup of water
 - a glass **prism** dispersing **white light** into its individual **colors** as the colors **refract** at different angles (as visible light exits the prism, it is refracted and separated into the **visible spectrum**).
- Light can be reflected when light bounces off an object.
- An example of this is light hitting a mirror



A prism refracts (bends) and separates white light

TRANSPARENT, TRANSLUCENT, OPAQUE

- Light passes through some materials easily (**transparent** materials), through some materials partially (**translucent** materials), and through some not at all (**opaque** materials).
- The relative terms **transparent**, **translucent**, and **opaque** indicate the amount of light that **passes through** an object.
 - Examples of **transparent** materials include **clear glass**, **clear plastic**, **food wrap**, **water**, and **air**.
 - Examples of **translucent** materials include **wax paper**, **frosted glass**, **thin fabrics**, and some **plastics**..
 - Examples of **opaque** materials include **metal**, **wood**, **bricks**..

