Topic 1 – What is Light? (pgs. 176 – 187)

Simply stated, light is the form of energy you can see. This energy can be produced **naturally** by the sun or fire, or **artificially** by light-producing technologies, like batteries.
Radiation is the wave like transfer of light from its source in all directions. Light is often called **radiant energy**. Light from the sun is formed by **nuclear fusion** (Off the Wall p. 176)

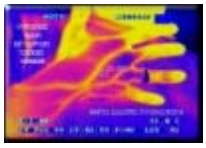
The First Basic Principle of Light

'***Light is a form of energy***' When light reaches a surface, it can be absorbed and transformed into other types of energy.

… into electrical energy

Solar cells change light into electricity

… into thermal energy



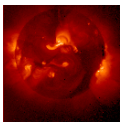
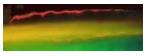
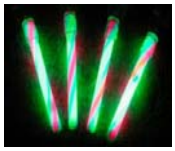
Cameras change light into thermal images

… into chemical energy

Trees convert light energy into food (chemical energy)

The amount of energy a surface receives depends on the **intensity** of the light.
The more intense the light, the more light can be absorbed.

Sources of Light

Natural **Light Sources**		***Artificial*** **Light Sources**	
Sun		**Incandescent** (heat causing a filament of metal to glow – visible light) Electrical energy → Thermal energy → Visible light energy	
Candles or Oil Lamps		**Florescent** (ultraviolet light is absorbed by fabric particles, which in turn emit some of the energy as light – glowing) Ultraviolet light energy → Energy absorbed by particles → Visible light energy	
Wood (fire)		**Phosphorescent** (light energy is stored and released later as visible light) paint	
Bioluminescence (light produced by living organisms)	 firefly light	**Chemiluminescent** (light energy released by chemical reactions) glow sticks Chemical energy → Visible light energy	

Other sources of Light Energy can come from the Earth's minerals including:

THERMOLUMINESCENCE and **TRIBOLUMINESCENCE**

The Cost of Lighting

Electrical energy costs money to produce. A **watt** is a unit of electrical power.
The cost is calculated by how much of the electrical energy is used over a certain period of time.
Calculations are made in kW**.**h's. 1 kW**.**h is 1000 watts of electrical energy operating for 1 hour.

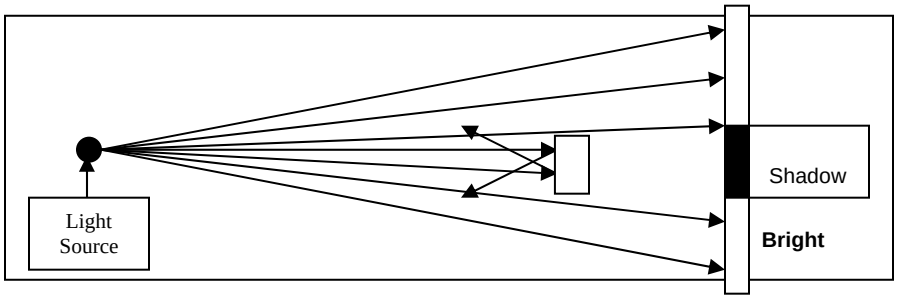
Example: Calculate the cost of leaving a **60W light bulb** on for **10 hours**.

Convert 60**W** to **kW** by dividing by 1000	60 **W** / 1000 = 0.06 **kW**
Calculate the number of **kW hours**	0.06 **kW** x 10 hours = 0.6 **kW.h**
Calculate the cost by multiplying the number of hours by the cost per **kW.h**	If the cost per kW**.**h is $0.08 The cost of electricity to operate the 60W light bulb for 2 hours would be 0.6 kW**.**h x $0.08 = $0.048 (**4.8 cents – or about 5 cents**)

The Ray Model of Light

'Light travels in straight lines'

Because of this principle, the **ray model of light** can help to explain certain properties light. A **ray** is a straight line that represents the path of a beam of light. The ray model helps to explain how **shadows** can be formed, when the ray of light is blocked by an object.



Light travels in straight lines until it strikes a surface.
The type of surface will determine how the light will continue.

If the surface is **transparent**, the light will **continue in a straight path** through the object
If the surface is **translucent**, the light will be **diverted (refracted)** after it passes through
If the surface is **opaque**, the light will be **blocked** and not allowed through the object

Diagram (Figure 3.12 p.185)