**Light**

* Light is a form of energy that travels in waves
* Light can travel through empty space, and it travels very fast!
* Light travels in straight lines, until it hits an object

**What happens when light hits an object?**

* Light can **pass through** the object
* **Absorbed** – light is taken in to the object
  + Dark objects absorb more light energy than light-colored objects
* **Reflected** – light bounces from the object
  + Reflected light that reaches your eyes from an object is what makes it possible to see it!
  + **Smooth surfaces**, like mirrors, create perfect reflections (Except that they are **backward**)
* **Refraction** – the bending of light as it moves from one material to another

**Types of Materials**

* **Transparent** – allows most of the light that hits it to pass through so you can see through it easily
  + Examples – window, plastic wrap, overhead transparencies
* **Translucent** – allows *some* light to pass through, but also absorbs and reflects some light so you can’t see through it clearly
  + Examples – wax paper, tissues paper, a frosted light bulb
* **Opaque** – material doesn’t allow any light to pass through, reflects or absorbs all light that hits it
  + Examples – classroom tables, walls, chairs, you are opaque!

**Prisms**

* Light from the sun contains all the colors seen in a rainbow
* When light enters a prism, each color refracts by a different amount and takes a different path
* When light leaves the prism, the colors change directions again! These changes in direction cause the colors to separate
* **Opaque objects appear to be colored because they reflect different waves of light to your eye**
  + Examples – a red light reflects red light waves and absorbs the other colors in the light, a white piece of paper reflects all the colors in the light, and a black object absorbs all the light waves
* Rainbows can form when there are tiny water droplets in the air – the droplets act like tiny prisms!

**Lenses**

* **Convex lens** – thicker in the middle than at the edges
  + As light waves move into the lens, they bend toward the thickest part (the middle)
  + Objects appear **larger** through a convex lens
* **Concave lens** – thicker at the edges than at the middle
  + As light waves enter the lens, they bend toward the thickest part (the edges)
  + An object seen through a concave lens appears to be **smaller**

**Sound**

* Sound is a form of **energy**
* Sound is made when something **vibrates** (A vibration is a back-and-forth movement of matter)
  + **Vibrations** cause the air nearby to vibrate, making the sound energy that you hear
  + Musical instruments make sounds by vibrating

**Sound Waves**

* Sound travels through the air as **waves** – travel in all directions from an object making a sound
* When a vibration occurs, molecules around it are pushed together, which pushes on the air molecules next to it. The compression is passed along, but each molecule returns to its original position after the waves passes
  + Picture a line of dominoes toppling over – the energy moves from the beginning of the line to the end of the line, but each domino stays in the same place
* **All matter can carry sound waves** – Matter that carries sound waves is called a **medium**
* **Sound waves cannot travel without a medium** – no sound in space because there is no air
* **The speed of sound depends on the medium through which it is moving**
  + Sound moves faster in solids and liquids than it does in gases

**Volume**

* The **loudness** of a sound is called **volume**
* The **more energy** a sound has, the **greater its volume** is
* The volume of a sound is measured in decibels (dB)

**Pitch**

* The **pitch** of a sound is **how high or how low** it is
* The number of vibrations per second is the **frequency** of a sound
  + A shorter string vibrates faster than a long string – there are more vibrations per second
  + **Small objects often vibrate at a higher frequency than large objects**
* A sound with a **high frequency** has a **high pitch**
* A sound with a **low frequency** has a **low pitch**

**Echoes and Absorption**

* When sound waves hit something, some or all of the energy can be **absorbed**
* **Soft** **surfaces** **absorb more sound** than hard surfaces (Imagine yelling into a pillow when you are angry)
* A sound that hits a **hard** surface **bounces** back instead of being absorbed – this is called an **echo**