**Class Notes:**

**Gravity:**

EVERYTHING that has mass has gravity! The more mass, the more gravity. That means that all objects are being pulled toward all other objects….. BUT Earth has such a large mass, that its gravitational force pulls everything toward the center of the earth (and not toward each other).

**Law of Universal Gravitation:**

All objects attract each other. The amount of the force depends on the mass of the objects and the distance between them.

Part 1 = Mass

As mass increases so does gravity.

Examples:

* Elephant has more Gravity between itself and the Earth than a mouse does.
* The moon has less gravity than the Earth does.

Part 2 = Distance

As distance increases gravity decreases. Inverse relationship.

Example:

There is less gravity between you and the sun. More gravity between you and the Earth.

Weight vs. Mass:

Measure of the force of gravity Measure of the amount

 acting on an object. of matter in an object.

Can change with location. Does not change with location.

Newtons (N) Kilograms

Measured with a scale. Measured with a balance.

**Acceleration due to Gravity:**

9.8 m/s/s for ALL OBJECTS on Earth.

Bowling ball vs. Golf Ball - They both fall at the same rate. The bowling ball has more inertia so it is harder to accelerate. Gravity pulls harder (it has more weight) because it has more mass. The opposite is true for the golf ball.

**Air Resistance and Falling Objects:**

Air is everywhere on Earth. As a result, objects don’t all fall with the same acceleration. Their shape and mass affect the air resistance (frictional force) acting to slow them down.

**Terminal velocity**

When air resistance (force pushing up) equals the force of gravity (force pulling down) a falling object stops accelerating and then continues to fall at a constant speed. The shape and mass of the objects determine the final speed or terminal velocity.

**Free Fall**

Gravity is the only force acting on the object causing it to fall/accelerate. This only can happen where there is no air…like in space.

Examples:

Satellites in orbit around the Earth.

Planets in orbit around the sun.

**In orbit:**

Gravity is the source of the centripetal force that makes satellites constantly change their direction…go around in a circular motion