Name: _____ Gravity, Mass, and Weight

Weight:

Mass is a measure of how much 'stuff' (matter) is in an object. ***Weight*** is a measure of the force acting on that stuff (matter) due to gravity.

The mass of a given object is the same everywhere, but its weight can change. The moon has only about 1/5 the mass of Earth, so the gravitational pull of the moon is only about 1/5 as strong as Earth's gravitational pull. This means that you would weigh *less* (*1/5 as much*) on the moon than on earth. *But your mass would stay the same*.

Mass and weight are different things. But they are related. Weight is proportional to mass. The more massive something is, the more it weighs.

Let's say we weigh two objects. If one object has twice as much mass as another object, it will weigh twice as much. If it has 3 times as much mass, it will weigh 3 times as much.

This is why we can weigh things to figure out how massive they are. Of course, this only works if we weigh both objects in the same place—for example, both on earth or both on the moon.

We commonly use units of weight (how heavy something is) rather than mass (the amount of material it's made from) to say how 'much' of something you have. Remember that mass and weight are related. So this works just fine here on earth. The heavier something is (the more it weighs), the more massive it must be (the more stuff there is).

But, this would not work out in space. Without gravity, all objects would be weightless. Why? Because weight is just a measure of the force (pull) of gravity on an object.

Units of Weight:

In the U.S., we use ounces, pounds, and tons to measure weight.

A slice of bread weighs about 1 **ounce** (**oz**).

1 **pound** (**lb.**) is 16 ounces. So, 1 ounce is 1/16 of a pound.

The abbreviation **lb.** for pound is short for *libra*, the Latin word for weight.

1 lb. = **16 oz.** *and* **1 oz.** = **1/16 lb.**

To measure heavy things, like trucks and heavy machinery, we use **tons**.

1 ton = **2000 lbs**. An elephant weights about 8 tons.

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Now, let's work some problems:

How many pounds are in ½ ton?

1 ton = 2000 lbs. So, ½ ton = ½ (2000 lbs.)

½ ton = ½ (2000 lbs.) = ½ x 2000 lbs. = (2000/2) lbs. = 1000 lbs.

Convert 32 ounces to pounds.

1 ounce = 1/16 lbs. So, 32 oz. = 32 x (1/16 lbs.)

32 x (1/16 lbs.) = (32 x 1/16) lbs. = (32/16) lbs. = 2 lbs.

1. The moon's gravity is only around 1/5 as strong as gravity here on earth. If you weigh 50 lbs. on earth, how much would you weigh on the moon?

2. Gravity on Jupiter is about 2½ times as strong as Earth's gravity. How much would you weigh on Jupiter if you weigh 50 lbs. here.

3. How much would you weigh far out in space if you weigh 50 lbs. on Earth?

4. You have a 1 pound candy bar. You divide it into 8 equal pieces. How many ounces does each piece weigh?

5. The largest dinosaurs probably weighed around 50 tons. How many pounds is that?