

The Properties of Matter

Chapter 2

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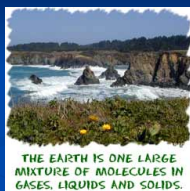


What do the following objects have in common?

- Give up?
- They are all made up of atoms and molecules, which means, they are all types of matter.
- So basically, everything in the universe is matter.
- Cupcakes are matter, baby elephants are matter, 8th graders are matter.
- Matter is everything around you.

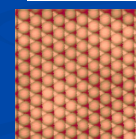
More Matter

- Matter is anything made of atoms and molecules.
- As of 1995, scientists have identified five states of matter - we will talk about these later.
- Matter is also anything that has volume and mass.

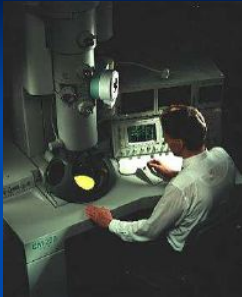


Let's take this carrot:

- Let's get closer and closer to the smaller parts of the carrot-carrot atoms!
- These small parts of the carrot are called atoms.
- Anything you see and can feel is made of atoms.



- All atoms are too small to be seen with the naked eye or even a microscope,
- although there are some new types of microscopes that are now able to see larger atoms such as gold.



Matter is made up of atoms!

- All matter is the same because all matter is made up of atoms.
- Matter is also different because objects can be made up of different kinds of atoms.
- Gold is made of one kind of atom-gold atoms.
- Salt is made up of two different kinds of atoms-sodium atoms and chloride atoms.

Objects have mass.



- Mass is how much there is of an object.
- Mass is related to how much something weighs.
- Mass and weight are two different things.
- The unit for mass is a gram.
- A nickel has the mass of about one gram.

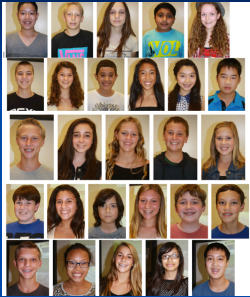
Objects have mass.



- Objects that take up space and have mass are called matter.
- Everything around you is made up of matter.
- Chocolate cake is made up of matter.
- You are made of matter.

Objects have mass.

- If you are having trouble understanding matter, look all around you.
- You can see matter makes up the walls of your house and your classroom.
- Matter is large and matter is small.




M is for Mass

- Mass is the amount of matter in an object.
- Mass is also affected by gravity.
- Gravity is a force of attraction between two objects.
- This force causes all objects to “pull” towards each other.
- The more mass two objects have; the stronger the pull.
- The closer the objects are to each other; the stronger the pull.

How are mass & weight different?

Mass is . . .

- a measure of the amount of matter in an object.
- always constant for an object no matter where the object is in the universe.
- measured with a balance (shown below).
- expressed in kilograms (kg), grams (g), and milligrams (mg).




- **Mass -**
- **A measurement of the amount of matter in an object (grams).**

How are mass & weight different?


Weight is . . .

- a measure of the gravitational force on an object.
- varied depending on where the object is in relation to the Earth (or any other large body in the universe).
- measured with a spring scale (shown above).
- expressed in newtons (N).



- **Weight -**
- **A measurement of the gravitational force of attraction of the earth acting on an object.**

1. Weight vs Mass!



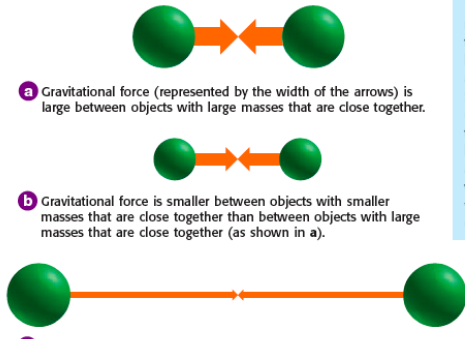
What about weight?

- Weight is the measure of **gravitational pull** on an object.
- Compare a brick to a sponge.
- The brick has mass. Earth has mass. Therefore, the brick and Earth are attracted to one another.
- The weight of the brick is a measure of this attraction by Earth.
- Now look at the sponge. It is the same *size* as the brick, but its *mass* is less.
- Therefore, the sponge's attraction to Earth is less.
- It's weight is also less than the brick.

Massive Confusion

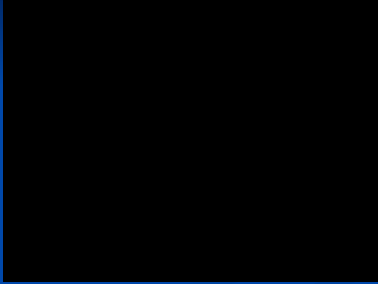
- On Earth, gravity is the same everywhere.
- Sooo... On Earth, mass and weight are the same thing.
- BUT, if you were to go to the moon, they would be different.
- The moon has less gravitational pull, so the attraction between you and the moon would be less.
- On the moon, your weight is less.
- Your mass remains the same though.

Figure 6 How Mass and Distance Affect Gravity Between Objects



- a** Gravitational force (represented by the width of the arrows) is large between objects with large masses that are close together.
- b** Gravitational force is smaller between objects with smaller masses that are close together than between objects with large masses that are close together (as shown in a).
- c** An increase in distance reduces gravitational force between two objects. Therefore, gravitational force between objects with large masses (such as those in a) is less if they are far apart.

2. Let's look at "Microgravity"



3. More Microgravity...

