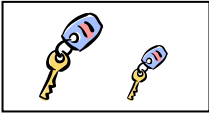


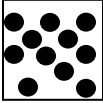
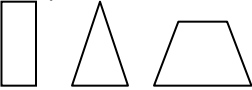














Matter Study Guide







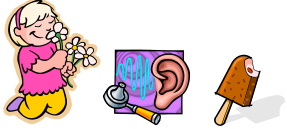



Matter is all around us... everything is made of matter. **Matter** is anything that takes up space and has mass.

We can classify objects by their physical properties. Physical properties are ways we describe an object. Some of the ways we can classify matter are by:


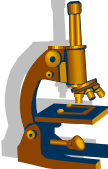
| | | | |
|--|--|--|---|
| <p>size</p>  | <p>length/height</p>  | <p>physical state (solid, liquid or gas)</p>  | <p>density</p>  |
| <p>shape</p>  | <p>mass</p>  | <p>magnetism</p>  | <p>buoyancy</p>  |
| <p>color</p>  | <p>volume</p>  | <p>ability to conduct or insulate thermal energy or electricity</p>  | <p>solubility in water (dissolves in water)</p>  |
| <p>texture</p>  | <p>temperature</p>  | <p>viscosity(ability to flow)</p>  | |
| <p>taste</p>  | <p>odor</p>  | | |

What are **tools** we can use to classify matter?

Making Sense of Matter

| tool | picture | what it measures |
|--------------------------------|---|--|
| Measuring cups/spoons |  | Volume |
| Graduated cylinders |  | Volume |
| Thermometers |  | Temperature—boiling point, freezing point, melting point |
| Timing Devices-stopwatch |  | Time |
| Triple beam balances | | Mass |
| Double Pan balances | | Mass |
| Spring Scales | | Mass in Newtons |
| Rulers/measuring tapes |  | Length |
| Sense of sight |  | Size, shape, color, texture, patterns, parts of system, physical state |
| Sense of smell, hearing, taste |  | odor, sound, flavor |
| Sense of touch |  | Hardness, ability to roll, texture |
| Magnets |  | magnetism |
| beakers |  | Density, solubility, viscosity |

Making Sense of Matter

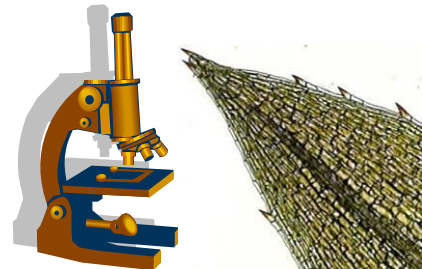
| | | |
|------------|---|-----------------------------|
| Hand lens |  | Magnifies to see properties |
| Microscope |  | Magnifies to see properties |

We can classify matter in many different ways!!

Sometimes we need to use tools just to be able to see because matter can be really small. **We use microscopes to magnify matter and give us the ability to see things we can't normally see.** When we look at a leaf with just our eyes, we see color, size, shape, texture. When we look at a leaf under a microscope, we can see the parts of the leaf that make photosynthesis happen!!!



We can use our eyes to describe
This leaf's color, shape, size, pattern

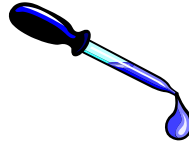


We need a microscope to see the cells and chloroplasts on the tip of a young leaf.

Matter can change! Sometimes matter changes its physical state. Water that reaches its freezing point turns into ice. Water that reaches its boiling point turns into water vapor. No matter what, it is still water. It has only changed state. **The molecules that make up**

Making Sense of Matter

water are still the same. We call this a **physical change**. If it can return to the state it was previously, it has only changed physically.



Matter changes physically if it is:

Cut, torn, folded, frozen, melted, boiled, mixed



Examples of physical changes: lemonade, folded paper, saltwater, melted ice, a mixture of paper clips and marbles.

When matter changes into a new substance, we call this a chemical change. When iron rusts, the rust is a new form of matter. The molecules have a new chemical structure. The rust parts cannot become steel again. Another example of a chemical change is burning wood. The ash that forms is a new substance. It cannot return to its previous state. Clue that a chemical change has happened could be: a

Making Sense of Matter

change in color, if heat is given off, if an odor is released, or if a precipitate forms. Also, if light is given off shows a chemical change.



Examples of chemical changes: a baked cake, burned wood, baking soda vinegar mixture, rotten eggs, cooked eggs, or leaves turning color

Mixtures and Solutions

Matter can be mixed with other matter.

When two or more things mix together and we can still separate them easily, we call it a **mixture**.

Each substance keeps its physical properties. Anything we can separate with a simple tool or with our hands is a mixture. Some examples of mixtures are: snack mix, ice water, and iron filings and sand.



Sometimes one substance will **dissolve** into the other when mixing. This is a special mixture called a **solution**.

In a **solution**, the molecules of one substance are dissolved evenly into the molecules of another.

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Water is an example of a solution of 2 hydrogen and 1 oxygen molecule. We cannot separate the hydrogen from the oxygen easily, and we cannot see their separate physical properties.

If we add lemon juice to water, we may not be able to see that the juice is in the water, but if we taste it we will know it is there!



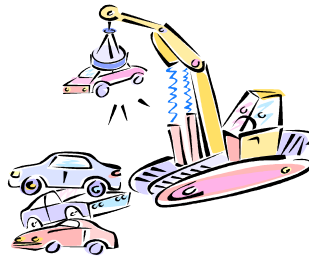
Other examples of solutions are: lemonade, air, carbon dioxide, saltwater and Kool-Aid

Not all solutions have the same concentration (amount of dissolved solids in the liquid). A solution with very few dissolved solids is a dilution. Do you remember how the diluted Kool-Aid tasted? How was it different from the saturated Kool-Aid that had too many dissolved solids?

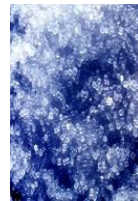
How do we separate mixtures and solutions?

Mixtures are easy to separate. We can use our hand or simple tools. Spoons, filters, tongs, strainers and magnets are some of the tools we can use to separate a mixture. We can also use water - some things float and others sink (ex: cork floats in water and rocks sink)

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Solutions are harder to separate. The easiest way to separate a solution that has water in it is to evaporate the water.



For example, if you have a solution of salt water, once water reaches 100°C , it will evaporate and the only thing left in the dish will be salt crystals. What happens if you put 10 mL of salt in water and evaporate it? All that would be left would be 10 mL of salt! Remember, the amount of salt does NOT change when the water evaporates!