Unit 1 What's in a Baseball? / Unit 2 Bo's House

Materials can be described by their properties. Understanding a material's properties is important when deciding whether the material is suitable for the use planned for it. Materials may be soft, hard, flexible (bendable), rigid (stiff), transparent (see-through), opaque (meaning light does not shine through it), rough, smooth, shiny, or dull.

An object can be made out of different materials used together; for example, a chair can be made from metal and wood and plastic.

Some materials may be more suitable than others for particular uses or for manufacturing specific objects; for example, metal shoes wouldn't be very comfortable and a cardboard door wouldn't be very strong!

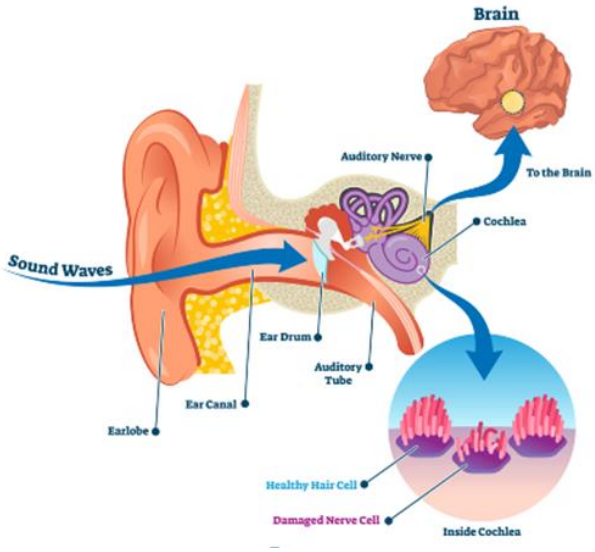
material		characteristic	common use
	metal	strong and good electrical conductor	cars, watches, knives and forks
	wood	strong and natural	table, chairs, pencils and doors
	brick	strong	walls and bridges
	paper	flexible and light	boxes, packaging, books and toilet paper
	plastic	flexible and waterproof	toys and bottles
	glass	transparent and hard	windows and glasswares
	fabric	absorbent and good heat insulator	shirts, pants and blankets

Unit 3 Solid Shapes / Unit 4 Solid or Liquid?

Solids are objects that keep their own shape and do not flow in a given temperature. Other examples of solids are cars, books and clothes. It can be different colors and textures, and they can be turned into different shapes, for example clay.

Various shapes of solid objects

Unit 5 Dancing Sounds / Unit 6 Buzzing Bees



Did you know sounds are made when an object vibrates? The vibrations make the air around an object vibrate and the air vibrations enter your ear. When the air vibrations reach the ear they shake tiny hairs, which are connected to nerves. It is these nerves that send a message to the brain telling it that a noise has been heard.

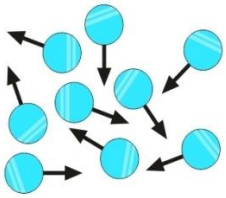
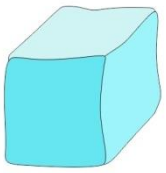
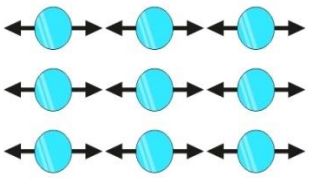
The rapid wing beats of bees create vibrations in the air that the human ear detects as buzzing. The bigger a bee is, the slower its wings beat. The slower its wings beat, the lower the pitch of the buzzing will sound.

Sound waves are vibrating energy that looks like waves. The waves are made of microscopic building blocks called molecules. Sound waves travel back and forth through solids, liquids and gases to get to another location. That's how you can hear sounds that are close to you, happening outside or underwater.

Can sound travel under the water?

Yes, sound can travel under the water. It moves four times faster through water than through the air. It can travel such long distances that whales can hear each other when they are nearly a hundred miles apart.

Unit 7 Juicy Cups / Unit 8 Shopping for Milk

liquid	
● assumes the shape of the container which it occupies ● has definite volume ● not easily compressible	
● Molecules are free to move over each other, but are still attracted to each other. ● Force between molecules is not strong.	
solid	
● retains a fixed shape ● has definite volume ● not easily compressible	
● Molecules are not free to move over each other, but vibrate. ● Force between molecules is strong.	

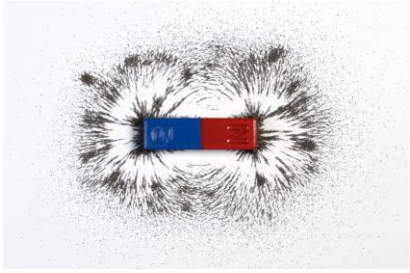
- A liquid can be poured and will take on the shape of the container that it is poured into.
- If you have a glass of water and pour it into another glass, it takes on the shape of the glass. If you spill the water, it will go everywhere, because it isn't in a container.
- Except for water, most liquids have particles which take up more space than they do when they are in their solid state. The particles in liquids can move around and slide past each other.

Background Knowledge

Unit 9 Having Fun with Magnets / Unit 10 My Favorite Hairpin

Magnets attract, or pull, objects made with iron. Paper clips, scissors, screws, nuts, and bolts are just a few common everyday objects that are magnetic. A magnet will not attract paper, rubber, wood, or plastic. It is not true that a magnet will attract any kind of metal. For example, aluminum cans are metal, but do not contain iron, therefore they are not magnetic. Steel is a metal that is made with iron, so steel objects like tools and silverware are usually magnetic.

Magnets have an unseen area around them called a "magnetic field". Magnetic objects inside this unseen field are attracted to the magnet. Magnetic things outside the magnetic field are not attracted to the magnet. This is why a magnet must be close to an object to attract it.



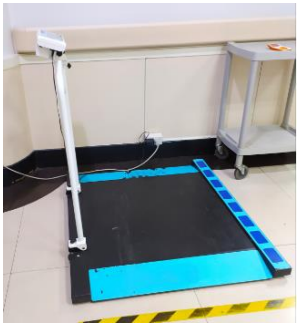
Magnets have many uses. One of them was found long ago when explorers found that a magnet could be used as a compass to show the direction of north & south.

A refrigerator also uses magnets. It uses magnetic seals on door. If the refrigerator is not perfectly closed, it uses much more energy. A properly sealed refrigerator saves energy and extends the lifespan of the food inside.

Unit 11 Making Scales / Unit 12 Different Kinds of Scales

Bathroom digital scales: These scales are very frequently used on a regular basis in order to determine the weight of a person. Although there are other kinds of weighing scales, digital scales are present in the market and they are preferred by people too. Usually people buy these scales due to their easy to read number displays, in addition to their accuracy and instant results. These weighing scales differ in size and shapes but they all are big enough to support one's feet.

Medical weighing machines: These medical weighing scales are suitable for doctor's office, for measuring the weights of the patients. These scales can hold an individual standing and in a wheelchair as well. The platform of these medical weighing scales are large and the weight they can measure is 500 pound plus. These machines also have a larger display which can also be seen from a distance and their accuracy is very good.



Kitchen weighing scales: These kitchen or food weighing machines are available in the market for commercial and personal purposes both. The personal weighing scales are comparatively smaller and used for weighing all types of food that are meant for a family size cooking. These scales are accurate but they are only used for weighing small weights.

Luggage weighing scales: These luggage weighing machines are larger in size and they are usually found in commercial areas, like airports. They have the ability to measure larger quantities of material.

Unit 13 Fruit Boats / Unit 14 The Farmer's Secret

Different fruits and vegetables will also float or sink depending on their density. In general, apples, bananas, lemons, oranges, pears, and zucchinis will float, while avocados, potatoes, and mangoes will sink. Others like turnips and sweet potatoes sometimes sink and sometimes float.

Whether a fruit or vegetable sinks or floats has a lot to do with its density. What is density? It's how heavy an object is compared to its volume. Imagine lifting a pillowcase full of feathers. Now imagine lifting a pillowcase full of apples. Which one would be heavier? They are both the same size, but since apples are denser than feathers, the one with the apples in it would be heavier.

Examples of different densities in different substances occur throughout everyday life.

• In an oil spill in the ocean, the oil rises to the top because it is less dense than water, creating an oil slick on the surface of the ocean.

• A Styrofoam cup is less dense than a ceramic cup, so the Styrofoam cup will float in water and the ceramic cup will sink.

• Wood generally floats on water because it is less dense than water. Rocks, generally being denser than water, usually sink. This obvious example illustrates the power of science in real life. Many widely used hardwoods, such as ebony, mahogany and lignum vitae, are dense enough to sink in water, and a few rocks, such as pumice, are light enough to float. Scientifically, what counts isn't the fact that one is wood and the other stone. All that matters is the relative densities of the substances.

• Helium balloons rise because helium is less dense than the surrounding air. Over time, the helium escapes the balloon and is replaced by air, causing it to sink.

Unit 15 Cars of the Future / Unit 16 Recording Sounds

Electric Car Engineer

Electric car engineers can be any type of engineer who works on electric cars, such as electrical and mechanical engineers who focus their work on electric car design, development and testing. Electric car engineers often collaborate with scientists and managers to design and produce new or improved electric vehicles. They also test the efficiency of these vehicles to determine the success of their designs.

Sound Engineer

Sound engineers play a vital role in the music industry. Anyone who ever has been to a concert and impressed with the clarity and overall quality of the music can thank a talented engineer controlling that sound.

Sound engineers mix, reproduce, and manipulate the equalization and electronic effects of sound. They don't have to work strictly in music. Some end up designing and controlling the sound at conferences, in theaters, and in any other venue that requires sound projection for an audience.

By controlling microphones, sound levels, and outputs, sound engineers combine their well-trained ears with their knowledge of acoustics to produce the best quality of sound for a variety of purposes. In addition to the music industry, sound engineers might work in film, radio, television, computer games, theater, sporting events, and corporate events.