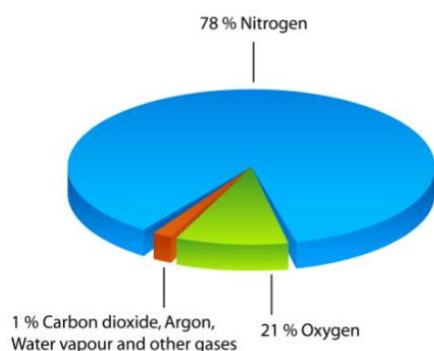


Unit 1 Bubbling Air / Unit 2 Tony's Balloon

Can we see air? If you go out on a windy day, you can feel the wind tugging at your body, hair, and clothes. You can see the trees and flowers bending and the clouds racing across the sky. Perhaps an old newspaper is blown along the road, or the smoke from a chimney is blowing out sideways instead of going straight up.

What is doing all this pushing and shoving? What is moving everything about?

It is air. We cannot see air as it is made up of colorless gases. No color is reflected and we cannot see air with the naked eye. We can, however, experience the presence of air around us in the movement of objects like trees, clothes and flags, which move or bend in the direction of winds and breezes.



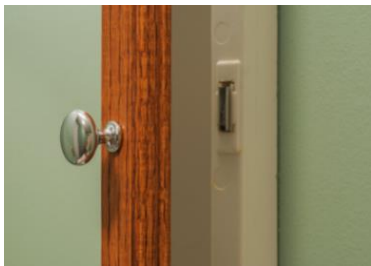
Air is all around us, but we can't see it. So what is air, exactly? It's a mixture of different gases. The air in Earth's atmosphere is made up of approximately 78 percent nitrogen and 21 percent oxygen. Air also has small amounts of lots of other gases, too, such as carbon dioxide, neon, and hydrogen.

Air is important for living things. People need to breathe, and so do lots of other animals—and plants! Breathing is part of a process called respiration. During respiration, a living thing takes in oxygen from the air and gives out carbon dioxide. This process gives animals and plants the energy to eat, grow, and live life!

Unit 3 Magnets Push and Pull / Unit 4 New Pencil Case

Magnets can be found in the objects you use every day.

Cabinet Door Latch: The doors to many medicine cabinets have a magnetic latch. A magnetic



latch consists simply of a permanent magnet in the cabinet and a metal piece on the door. The magnet has just enough force to hold the door shut and opens easily when you pull on it. The magnetic refrigerator door seal replaced mechanical door latch mechanisms in the late 1950s as a safety measure.

Blocks, Trains and Other Toys: Many building toys have magnets in them. The magnets make the building blocks stick together.



You'll also see magnet couplers used to connect the cars in a toy train set. Magnetic



chess and checkers sets keep the game organized with a little magnet in each game piece. By themselves, magnets make fascinating toys and clearly demonstrate magnetic principles.

Debit and Credit Cards: The bank cards in your wallet have a dark magnetic strip on the back.



The strip contains data codes including the account number and your name. When you swipe the card at a store, an electronic device in the reader senses the magnetic codes and converts them into readable words and numbers. Note that the data strip has relatively weak magnetism; contact with strong magnets can damage or erase it.

Unit 5 Growing Seeds / Unit 6 Growing Tomatoes

Almost all plants need these five things to survive; light, air, water, nutrients and a space to grow.

Light: Plants usually get the light they need from the Sun. But they can also grow in artificial light. Plants use light energy to make a type of sugar called glucose. They use glucose as their energy source. Plants make glucose in a part of their leaf cells called the chloroplast. Each chloroplast contains a green pigment called chlorophyll. It's what allows the plant to absorb light energy.

Air: Air contains many gases. They include nitrogen, oxygen, carbon dioxide and water vapor.

Water: Plants need water for photosynthesis. Absorbed by the roots, water travels through a plant's stems to the chloroplasts in the leaves. Water also helps move nutrients from the soil into the plant. Too little water can cause a plant to wilt or droop. Too much water can cause a plant's roots to rot.

Nutrients: Nutrients are substances that nourish a plant. In particular, plants need nitrogen, phosphorus and potassium. When dissolved in water, these nutrients get absorbed by a plant's roots. If a plant can't get the nutrients it needs from the soil, fertilizer can help. Fertilizer provides plants with essential nutrients and helps them grow faster.

Space to Grow: All living things need space. A plant's roots need space so that they can spread out and absorb water and nutrients. Its leaves need space so that they access light. When plants grow too close together, they have to compete for these resources.

Unit 7 How Rocks Become Soil / Unit 8 The Magic of Nature

Weathering is the name given to the process by which rocks are broken down to form soils. Rocks and geological sediments are the main parent materials of soils. There is a very wide variety of rocks in the world, some acidic, some alkaline, some coarse-textured like sands, and some fine-textured and clayey. It is from the rocks and sediments that soils inherit their particular texture. When you see rocks in the landscape it is easy to appreciate how long the process of breaking down rocks to form soil takes. In fact, it can take over 500 years to form just one centimeter of soil from some of the harder rocks. Fortunately, in some respects at least, huge amounts of rocks were broken down during the Ice Age over 10,000 years ago and converted into clays, sands or gravels, from which state it was easier to form soils.

There are three main types of weathering; physical, chemical and biological.



Physical weathering is the influence of processes such as freezing and thawing, wetting and drying, and shrinking and swelling on rocks and other sediments, leading to their breakdown into finer and finer particles.

Chemical weathering is the decomposition of rocks through a series of chemical processes such as acidification, dissolution and oxidation. Some minerals, while stable within solid rock, become less stable on being more exposed to the atmosphere and so begin to alter in the rocks near the surface, destabilizing the rocks.

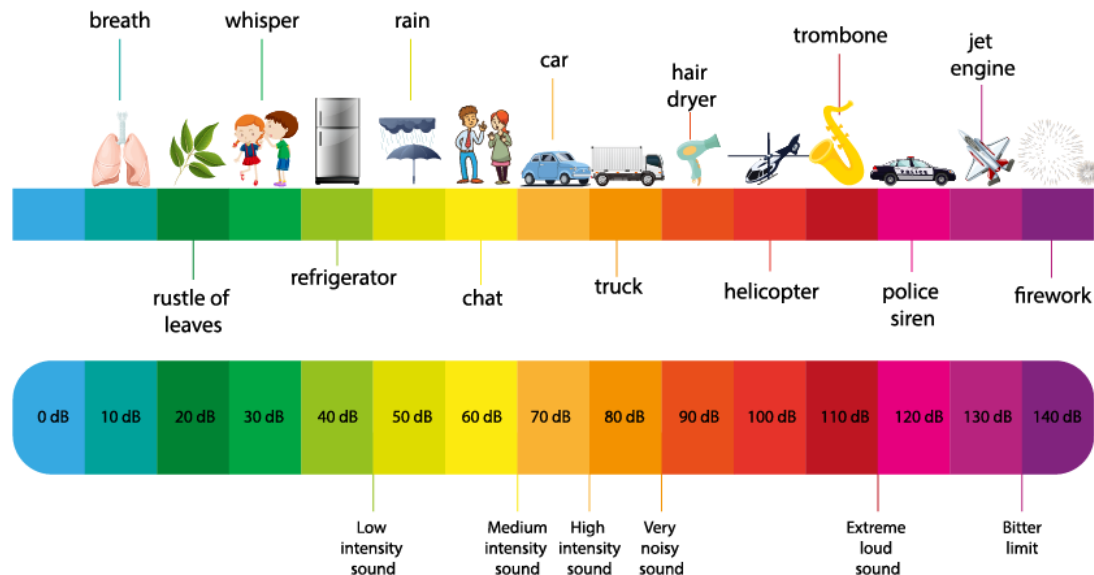


Biological weathering is the effect of living organisms on the breakdown of rock. This involves, for example, the effects of plant roots and soil organisms. Respiration of carbon dioxide by plant roots can lead to the formation of carbonic acid which can chemically attack rocks and sediments and help to turn them into soils.

There are a whole range of weathering processes at work near the surface of the soil, acting together to break down rocks and minerals to form soil. These weathering processes have given rise to most of the world's soils.

Unit 9 The Shaking Drum / Unit 10 Ticking Clock

Sound is created when something vibrates and sends waves of energy (vibration) into our ears. The vibrations travel through the air or another medium (solid, liquid or gas) to the ear. The stronger the vibrations, the louder the sound. Sounds are fainter the further you get from the sound source.



The decibel (abbreviated dB) is the unit used to measure the intensity of a sound. The decibel scale is a little odd because the human ear is incredibly sensitive. Your ears can hear everything from your fingertip brushing lightly over your skin to a loud jet engine. In terms of power, the sound of the jet engine is about 1,000,000,000,000 times more powerful than the smallest audible sound. That's a big difference!

On the decibel scale, the smallest audible sound (near total silence) is 0 dB. A sound 10 times more powerful is 10 dB. A sound 100 times more powerful than near total silence is 20 dB. A sound 1,000 times more powerful than near total silence is 30 dB. Above are some common sounds and their decibel ratings:

Humans can hear sounds between 0 and 140 decibels. 0 decibel does not mean that there is no sound, merely that we cannot hear it. 0 decibel is the so-called hearing threshold for the human ear.

Unit 11 Different Shadows / Unit 12 Stop Following Me!

During the day we get sufficient light from the sun and so we can see the objects clearly. But when you enter a dark room, will you be able to see the objects around you? No! Because there is no light present there.

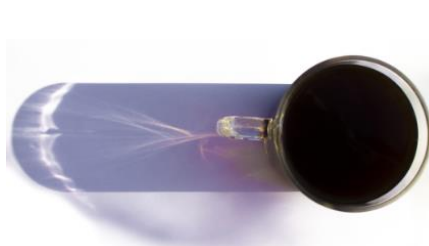
Yes, we can see things in the dark only when we switch on the light. We can see the chairs, table, TV, utensils and everything around you. Light is one of the important things that is required to see objects around us. It is the source of invisible energy which gives us the sensation of sight.

Some objects allow the light to pass through them while some objects don't. And in some objects, light passes partially through them.

Transparent objects: These objects allow the light to pass through them. Take a transparent glass and fill it with water. Now take a torch and allow the torchlight to pass through the glass. You are able to see the light as the water is transparent and allows the light to pass through it.

Translucent objects: These objects allow the light to partially pass through them. That means it allows some light to pass through it while blocking some of the light. e.g. If we take some milk in the glass and allow the torchlight to pass through it, milk will allow a very little ray of light to pass through it as milk is a translucent object.

Opaque objects: These objects do not allow the light to pass through them at all. e.g. If we take some amount of tea in the glass and allow the torchlight to pass through it. The tea being an opaque object won't allow the light to pass through it.



Unit 13 Gravity Pulls / Unit 14 A Fallen Apple

Gravity is very important to our everyday lives. Without Earth's gravity we would fly right off our planet! We'd all have to be strapped down all the time and if you kicked a ball, it would fly off forever. While it might be fun to try for a few minutes, we certainly couldn't live life on Earth without gravity.

Gravity also is important on a larger scale. It is the Sun's gravity that keeps the Earth in orbit around the Sun. Life on Earth needs the Sun's light and warmth to survive. Gravity helps the Earth to stay just the right distance from the Sun, so it's not too hot or too cold.

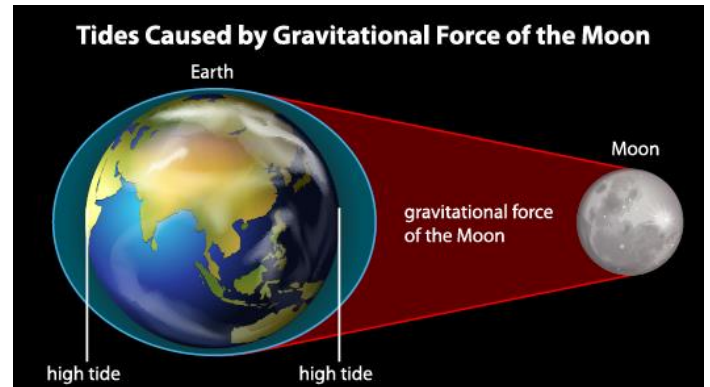
Facts about gravity

1. The bigger the object's mass, the more gravity it will have; the smaller the mass of the object, the less gravity it is subject to.
2. Gravity guides the growth of plants and other vegetation.
3. Black holes have the strongest gravitational pull in the entire universe.
4. The Earth is a giant magnet. Its magnetic field is like a bar magnet at its center.



5. Sir Isaac Newton discovered gravity about 300 years ago. The story is that Newton saw an apple fall out of a tree. When this happened, he realized there was a force that made it occur, and he called it gravity.

1. Ocean tides are caused by the gravity of the moon.



2. If you could travel from planet to planet your mass would stay the same, but your weight would vary depending on how the gravity of that planet pulled on you. Mars is smaller and has less mass than Earth and as a result it has less gravity. If you weigh 100 pounds on Earth, you would weigh 38 pounds on Mars.
3. At some point when falling, the friction from the air will equal the force of gravity and the object will be at a constant speed. This is called the terminal velocity. For a skydiver this speed is around 100 miles per hour!
4. We don't actually "feel" gravity. We only feel the effects of trying to overcome it by jumping or when we fall.
5. Gravity always pulls, it never pushes.

Unit 15 Modern Farming

The primary goal of farm automation technology is to cover easier, mundane tasks. Here are some major technologies that are most commonly being utilized by farms.

Harvest Automation: Harvesting fruits and vegetables have always proven to be a difficult problem to automate. Harvest robots must be gentle with the produce to avoid bruising and damage. Agrobot has successfully developed the first robot for gently harvesting strawberries, no matter where and how they are grown. From a flexible mobile platform, up to 24 robotics manipulators work together to pick the fruit which meets the farmer's quality standard.



Another company, Abundant Robotics, is the world's first commercial robotic apple harvest. Their machines handle fragile fruits by using a vacuum instead of any claw or hand-like graspers to pull apples from the branch.

Seeding and Weeding: Robotics developed for seeding and weeding can target specific crop areas. In seeding, this can easily reduce labor and mundane tasks on the farm. Weeding robotics can be incredibly accurate and reduce pesticide usage by 90% with computer vision. Blue River Technology employs computer vision and robotics technologies to precisely spray herbicides only where needed and with exactly what's needed. This gives farmers a new way to control and prevent herbicide-resistant weeds. ecoRobotix is another company that produces a weeding robot - this is the first ever completely autonomous machine for a more ecological and economical weeding of row crops, meadows, and intercropping cultures.



Unit 16 Robot Pill

Biotechnology is a technology that involves the use of living organisms. Biotechnology is mainly used in agriculture, food science, and medicine.

- Reducing rates of infectious disease
- Saving millions of children's lives
- Changing the odds of serious, life-threatening conditions affecting millions around the world
- Tailoring treatments to individuals to minimize health risks and side effects
- Creating more precise tools for disease detection
- Combating serious illnesses and everyday threats confronting the developing world