**LPSCE Science Review**

**Grade 6**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Studying science is similar to solving a jigsaw puzzle. Usually, the puzzle has a theme that leads you to group the pieces by what they have in common. For example, pieces with a certain color or design that go along with the picture on the box top. The big ideas of science are like puzzle themes. To solve these big ideas, scientists ask questions. The answers to the questions are like puzzle pieces that fit together.

|  |
| --- |
| Vocabulary  Force gravity inertia  Mass weight Newton’s first law of Motion |

Earth revolves around the sun and the moon orbits around Earth. What keeps them in orbit? Why don’t they just fly off into space?

In the 1600s, a scientist names Sir Isaac Newton realized that there must be a force acting between Earth and the moon that kept the moon in orbit.

What is a force?

A push or a pull exerted on an object.

Gravity

Gravity is a force that attracts all objects toward each other. One of both of the objects has to have a very large mass. One of Newton’s laws states that every object in the universe attracts every other object. The strength of the force of gravity between two objects depends on:

-the masses of the objects

-the distance between the objects

REVIEW!

Mass is the amount of matter in an object. Mass does not change.

Weight is the measure of the force of gravity on an object. Weight can change depending on the object’s location.

•The greater the mass, the stronger the force of gravity.

•The closer the distance, the stronger the force of gravity.

Fun fact: On the moon, you would weigh about one sixth as much as on Earth. Use what you now know about gravity to explain why this makes sense…

Inertia

Inertia is the tendency of an object to resist a change in motion. Newton’s first law of motion states that an object at rest will stay at rest and an object in motion will stay in motion with a constant speed and direction unless acted on by a force. The greater an object’s mass, the more inertia it has. An object with greater inertia is EASIER or MORE DIFFICULT

Vocabulary:

Solar system planet

Dwarf planet planetesimals

Our solar system consists of

-the sun

-the planets/

their moons

-a variety of smaller objects like asteroids and comets

Gravity is the force that holds the solar system together.

Earth’s solar system is part of the Milky Way galaxy.

The Milky Way and other galaxies make up the universe.

The Sun

The sun is the center of our solar system. It’s more than a million times the volume of Earth, yet it is just a mid-sized star. Our sun will last for 5 billion more years. To put that into perspective, Earth is about 4.5 billion years old.

Planets

In 2006, scientists came up with today’s definition of a planet:

A planet must be round, orbit the sun, and have cleared out the region of the solar system along its orbit. That means, as it orbits the sun, there can’t be anything in the way of its orbit.

Mercury, Venus, Earth, and Mars are small and made mostly of rock and metal.

Jupiter, Saturn, Uranus, and Neptune are very large and made mostly of gas and liquid.

Each planet has a day, or the time it takes to rotate once on its axis. A year is the time it takes to orbit the sun.

Dwarf planets are objects that orbit the sun and has enough gravity to be spherical but it has NOT cleared the area of its orbit.

Pluto, Eris, Ceres, Makemake, and Haumea are the dwarf planets in our solar system.

How Did the Solar System Form?

Scientists think our solar system formed about 4.6 BILLION years ago from a cloud of hydrogen, helium, rock, ice and other materials pulled together by gravity. Our sun was formed when the cloud began to spin and become tightly packed. This increased the pressure and temperature of the cloud so much that hydrogen atoms formed helium. This is called nuclear fusion and it produces large amounts of energy. Sunlight began and became a stable star.

Away from the sun, gravity pulled on rock, ice, and gas forming small bodies called planetesimals. Over long periods of time, the planetesimals collided and stuck together to form the other objects in the solar system.

***Inner planets***:

Bodies had lower masses and less ice because it evaporated. Lower mass meant less gravity to hold in gases. This is why inner planet are small and rocky.

***Outer planets***:

Temperatures were cooler farther away from the sun. Iced formed and planets grew in size, making their masses large enough for gravity to hold in gases---these are the gas giants.

Vocabulary

|  |
| --- |
| phase eclipse  umbra penumbra  solar eclipse lunar eclipse |

Does moonlight come from the moon like sunlight comes from the sun? NO! The moon’s surface is reflecting the sun’s light back to your eyes on Earth. Why is the moon different shapes on different nights? (sometimes a circle, or a crescent, or barely any shape at all)The different shapes of the moon you see from Earth are called phases. Phases are caused by the motions of the moon around Earth.

Motions of the Moon

When you look up at the moon, you may see what looks like a face. Some people call this the “Man in the Moon”. What you are seeing is really a pattern of light and dark colors on the moon’s surface that happens to look like a face.

Did you ever notice that the face never seems to move, even though the moon is orbiting Earth?

The same side of the moon, the “near side”, always faces Earth. The “far side” always faces away. WHY?

The moon moves like Earth—in two ways.

•It revolves around Earth

•It rotates on its own axis

On “DAY” on the moon is the same amount of time as one “MONTH” on Earth. So....the same side of the moon is always facing Earth.

As the moon orbits Earth, the relative positions of the moon, Earth, and sun change. **The changing relative positions of the moon,** **Earth, and sun cause the phases of the moon.**

What are Eclipses?

The moon’s orbit around Earth is slightly tilted with respect to the Earth’s orbit around the sun. In other words, most times, they do not line up. The moon travels above or below Earth’s orbit.

An eclipse occurs when on object in space comes between the sun and the third object. A shadow is cast upon the third object. This is an eclipse. There are 2 types of eclipses:

•Solar eclipse

* Lunar eclipse

Solar Eclipse:

A solar eclipse happens during a new moon and occurs when the moon passes directly between Earth and the sun, blocking the sunlight from Earth. The moon’s shadow then hits Earth.

The darkest part of the moon’s shadow is the umbra. It occurs during a total solar eclipse. The sky will turn dark as night. Only parts of Earth will experience the complete umbra. You can even see stars! Nocturnal animals might come out.

The **penumbra** is the part of the shadow that is less dark. This happens in a partial solar eclipse. Part of the sun is still visible from Earth.

Lunar Eclipse

Lunar eclipses occur at a full moon with Earth is directly between the moon and the sun. Earth blocks the electromagnetic waves of the sun from reaching the moon.

Just like a solar eclipse, there is an umbra and penumbra, so there are total lunar eclipses and partial lunar eclipses. Unlike a solar eclipse, a total lunar eclipse can be seen anywhere on Earth that the moon is visible.

Fossils are the preserved remains, or traces of remains, of ancient organisms. Fossils are not the remains of the organism itself! They are rocks.

A fossil can preserve an entire organism or just part of one. Bones, shells, feathers, and leaves can all become fossils.

Fossils can be very large or very small. Microfossils are only visible with a microscope. Bacteria and pollen are microfossils. Macrofossils can be several meters long and weigh several tons. Macrofossils can be petrified trees or dinosaur bones.

Preserved remains become fossils if they reach an age of about 10,000 years. Fossils can come from the Archaeaean Eon (which began almost 4 billion years ago) all the way up to the Holocene Epoch (which continues today). The fossilized teeth of wooly mammoths are some of our most "recent" fossils. Some of the oldest fossils are those of ancient algae that lived in the ocean more than 3 billion years ago.

**Fossilization**

The word fossil comes from the Latin word *fossus*, meaning "having been dug up." Fossils are often found in rock formations deep in the earth.

Fossilization is the process of remains becoming fossils. Fossilization is rare. Most organisms decompose fairly quickly after they die.

For an organism to be fossilized, the remains usually need to be covered by sediment soon after death. Sediment can include the sandy seafloor, lava, and even sticky tar.

Over time, minerals in the sediment seep into the remains. The remains become fossilized. Fossilization usually occur in organisms with hard, bony body parts, such as skeletons, teeth, or shells. Soft-bodied organisms, such as worms, are rarely fossilized.

Sometimes, however, the sticky resin of a tree can become fossilized. This is called fossilized resin or amber. Amber can preserve the bodies of many delicate, soft-bodied organisms, such as ants, flies, and mosquitoes.

**Body Fossils and Trace Fossils**

The fossils of bones, teeth, and shells are called body fossils. Most dinosaur fossils are collections of body fossils.

Trace fossils are rocks that have preserved evidence of biological activity. They are not fossilized remains, just the traces of organisms. The imprint of an ancient leaf or footprint is a trace fossil. Burrows can also create impressions in soft rocks or mud, leaving a trace fossil.

**Paleontologists**

Paleontologists are people who study fossils. Paleontologists find and study fossils all over the world, in almost every environment, from the hot desert to the humid jungle. Studying fossils helps them learn about when and how different species lived millions of years ago. Sometimes, fossils tell scientists how the Earth has changed.

Fossils of ancient marine animals called ammonites have been unearthed in the highest mountain range in the world, the Himalayas in Nepal. This tells scientists that millions of years ago, the rocks that became the Himalayas were at the bottom of the ocean.

Fossils of an ancient giant shark, a megalodon, have been found in the landlocked U.S. state of Utah. This tells scientists that millions of years ago, the middle of North America was probably entirely underwater.

Juvenile pterodactyls like this one are called "flaplings."

**Microfossils**  
Even though most of us have only seen dinosaur fossils in museums, most fossils are not that big. Some of them are so small, you can't see them without a microscope.

The fossil record helps paleontologists, archaeologists, and geologists place important events and species in the appropriate geologic era. It is based on the Law of Superposition which states that in undisturbed rock sequences the bottom layers are older than the top layers. Therefore, some discovered fossils are able to be dated according to the strata, a distinct layer of rock, that they are found in.  Another common way that fossils are dated, is through radiocarbon dating. The development of this type of dating, in the 1950s, transformed paleontology and enhanced the accuracy of the fossil record. With every new fossil discovery, our understanding of the environment in a particular time becomes richer.

Extinction is the complete disappearance of a species from Earth. Species go extinct every year, but historically the average rate of extinction has been very slow with a few exceptions. The fossil record reveals five uniquely large mass extinction events during which significant events such as asteroid strikes and volcanic eruptions caused widespread extinctions over relatively short periods of time. Some scientists think we might have entered our sixth mass extinction event driven largely by human activity. Our planet is dependent on an interconnected system. If we lose one species, how does that impact the whole system? What if we lose hundreds? Help your students understand the gravity of extinction with these classroom resources.

Dinosaurs gambol and charge through our imagination as scaly reptilian creatures with menacing teeth, claws, spikes, and hammering, bony bulbs. They roamed Earth roughly 175 million years ago, and most were wiped out by an extinction event roughly 65 million years ago. Thanks to ongoing scientific research, we continue to revise our theories about how dinosaurs evolved, what they ate, and how they moved through their environments. Read about the latest discovery in National Geographic’s Science article: [Bizarre Spinosaurus Makes History as First Known Swimming Dinosaur.](https://www.nationalgeographic.com/science/2020/04/first-spinosaurus-tail-found-confirms-dinosaur-was-swimming/?ngscourse)

Paleontology is the study of the history of life on Earth as based on fossils. Fossils are the remains of plants, animals, fungi, bacteria, and single-celled living things that have been replaced by rock material or impressions of organisms preserved in rock.

**Introduction**

The way things happen now is the same way things happened in the past. Earth processes have not changed over time. Mountains grow and mountains slowly wear away, just as they did billions of years ago. As the environment changes, living creatures adapt. They change over time. Some organisms may not be able to adapt. They become **extinct**, meaning that they die out completely.

Historical geologists study the Earth’s past. They use clues from rocks and fossils to figure out the order of events. They think about how long it took for those events to happen.

## Laws of Stratigraphy

The study of rock strata is called **stratigraphy**. The laws of stratigraphy can help scientists understand Earth’s past. The laws of stratigraphy are usually credited to a geologist from Denmark named Nicolas Steno. He lived in the 1600s.

### Law of Superposition

Superposition refers to the position of rock layers and their relative ages. **Relative age** means age in comparison with other rocks, either younger or older. The relative ages of rocks are important for understanding Earth’s history. New rock layers are always deposited on top of existing rock layers. Therefore, deeper layers must be older than layers closer to the surface. This is the **law of superposition**.

### Law of Lateral Continuity

Rock layers extend laterally, or out to the sides. They may cover very broad areas, especially if they formed at the bottom of ancient seas. Erosion may have worn away some of the rock, but layers on either side of eroded areas will still “match up.”

The Grand Canyon in **the United States** is a good example of lateral continuity. You can clearly see the same rock layers on opposite sides of the canyon. The matching rock layers were deposited at the same time, so they are the same age.

### Law of Original Horizontality

Sediments were deposited in ancient seas in horizontal, or flat, layers. If sedimentary rock layers are tilted, they must have moved after they were deposited.

### Law of Cross-Cutting Relationships

Rock layers may have another rock cutting across them, like the igneous rock in the link below. To determine this, we use the law of cross-cutting relationships. The cut rock layers are older than the rock that cuts across them.

## Unconformities

Geologists can learn a lot about Earth’s history by studying sedimentary rock layers. But in some places, there’s a gap in time when no rock layers are present. A gap in the sequence of rock layers is called an **unconformity**.

Look at the rock layers in **link** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.2/#x-ck12-TVMtRVMtMTEtMTEtaHV0dG9uLXVuY29uZm9ybWl0eQ..). They show a feature called Hutton’s unconformity. The unconformity was discovered by James Hutton in the 1700s. Hutton saw that the lower rock layers are very old. The upper layers are much younger. There are no layers in between the ancient and recent layers. Hutton thought that the intermediate rock layers eroded away before the more recent rock layers were deposited.

Hutton's discovery was a very important event in geology! Hutton determined that the rocks were deposited over time. Some were eroded away. Hutton knew that deposition and erosion are very slow. He realized that for both to occur would take an extremely long time. This made him realize that Earth must be much older than people thought. This was a really big discovery! It meant there was enough time for life to evolve gradually.

## Matching Rock Layers

When rock layers are in the same place, it’s easy to give them relative ages. But what if rock layers are far apart? What if they are on different continents? What evidence is used to match rock layers in different places?

### Widespread Rock Layers

Some rock layers extend over a very wide area. They may be found on more than one continent or in more than one country. For example, the famous White Cliffs of Dover are on the coast of southeastern England. These distinctive rocks are matched by similar white cliffs in France, Belgium, Holland, Germany, and Denmark. It is important that this chalk layer goes across the English Channel. The rock is so soft that the Channel Tunnel connecting England and France was carved into it!

### Key Beds

Like index fossils, key beds are used to match rock layers. A **key bed** is a thin layer of rock. The rock must be unique and widespread. For example, a key bed from around the time that the dinosaurs went extinct is very important. A thin layer of clay was deposited over much of Earth’s surface. The clay has large amount of the element iridium. Iridium is rare on Earth but common in asteroids. This unusual clay layer has been used to match rock up layers all over the world. It also led to the hypothesis that a giant asteroid struck Earth and caused the dinosaurs to go extinct.

### Using Index Fossils

Index fossils are commonly used to match rock layers in different places. If two rock layers have the same index fossils, then they’re probably about the same age.

## The Geologic Time Scale

Earth formed 4.5 billion years ago. Geologists divide this time span into smaller periods. Many of the divisions mark major events in life history.

### Dividing Geologic Time

Divisions in Earth history are recorded on the **geologic time scale**. For example, the Cretaceous ended when the dinosaurs went extinct. European geologists were the first to put together the geologic time scale. So, many of the names of the time periods are from places in Europe. The Jurassic Period is named for the Jura Mountains in France and Switzerland, for example.

### Putting Events in Order

To create the geologic time scale, geologists correlated rock layers. Steno's laws were used to determine the relative ages of rocks. Older rocks are at the bottom and younger rocks are at the top. The early geologic time scale could only show the order of events. The discovery of radioactivity in the late 1800s changed that. Scientists could determine the exact age of some rocks in years. They assigned dates to the time scale divisions. For example, the Jurassic began about 200 million years ago. It lasted for about 55 million years.

### Divisions of the Geologic Time Scale

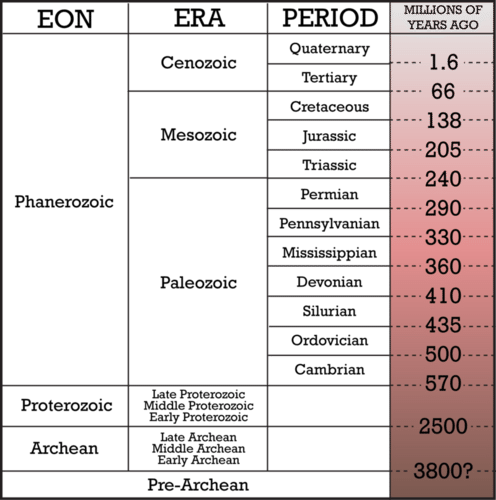
The largest blocks of time on the geologic time scale are called “eons.” Eons are split into “eras.” Each era is divided into “periods.” Periods may be further divided into “epochs.” Geologists may just use “early” or “late.” An example is “late Jurassic,” or “early Cretaceous.” **Figure** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.2/#x-ck12-TVMtRVMtMTItMDEtZ2VvbG9naWMtdGltZS1zY2FsZQ..) shows you what the geologic time scale looks like.

### Life and the Geologic Time Scale

The geologic time scale may include illustrations of how life on Earth has changed. Major events on Earth may also be shown. These include the formation of the major mountains or the extinction of the dinosaurs. **Figure** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.2/#x-ck12-TVMtRVMtMTItMDItZ2VvbG9naWMtdGltZS1zY2FsZS1zcGlyYWw.) is a different kind of the geologic time scale. It shows how Earth’s environment and life forms have changed.

### Your Place in Geologic Time

We now live in the Phanerozoic Eon, the Cenozoic Era, the Quaternary Period, and the Holocene Epoch. “Phanerozoic” means visible life. During this eon, rocks contain visible fossils. Before the Phanerozoic, life was microscopic. The Cenozoic Era means new life. It encompasses the most recent forms of life on Earth. The Cenozoic is sometimes called the Age of Mammals. Before the Cenozoic came the Mesozoic and Paleozoic. The Mesozoic means middle life. This is the age of reptiles, when dinosaurs ruled the planet. The Paleozoic is old life. Organisms like invertebrates and fish were the most common lifeforms.



The Geologic Time Scale.

(See this helpful link for distinctive rocks, rock layers, geologic time scale, etc. <https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.2/>

## Introduction

The age of a rock in years is its **absolute age**. Absolute ages are much different from relative ages. The way of determining them is different, too. Absolute ages are determined by radiometric methods, such as carbon-14 dating. These methods depend on radioactive decay.

## Radioactive Decay

**Radioactive decay** is the breakdown of unstable elements into stable elements. To understand this process, recall that the atoms of all elements contain the particles protons, neutrons, and electrons.

### Isotopes

An element is defined by the number of protons it contains. All atoms of a given element contain the same number of protons. The number of neutrons in an element may vary. Atoms of an element with different numbers of neutrons are called **isotopes**.

Almost all carbon atoms are carbon-12. This is a stable isotope of carbon. Only a tiny percentage of carbon atoms are carbon-14. Carbon-14 is unstable. **Figure** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.3/#x-ck12-TVMtRVMtMTEtMTUtY2FyYm9uLTE0LWZvcm1hdGlvbg..) shows carbon dioxide, which forms in the atmosphere from carbon-14 and oxygen. Neutrons in cosmic rays strike nitrogen atoms in the atmosphere. The nitrogen forms carbon-14. Carbon in the atmosphere combines with oxygen to form carbon dioxide. Plants take in carbon dioxide during photosynthesis. In this way, carbon-14 enters food chains.

### Decay of Unstable Isotopes

Like other unstable isotopes, carbon-14 breaks down, or decays. For carbon-14 decay, each carbon-14 atom loses an alpha particle. It changes to a stable atom of nitrogen-14. This is illustrated in **Figure** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.3/#x-ck12-TVMtRVMtMTEtMTYtY2FyYm9uLTE0LWRlY2F5).

The decay of an unstable isotope to a stable element occurs at a constant rate. This rate is different for each isotope pair. The decay rate is measured in a unit called the half-life. The **half-life** is the time it takes for half of a given amount of an isotope to decay. For example, the half-life of carbon-14 is 5730 years. Imagine that you start out with 100 grams of carbon-14. In 5730 years, half of it decays. This leaves 50 grams of carbon-14. Over the next 5730 years, half of the remaining amount will decay. Now there are 25 grams of carbon-14. How many grams will there be in another 5730 years? **Figure** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.3/#x-ck12-TVMtRVMtMTEtMTctcmF0ZS1jYXJib24tMTQtZGVjYXktZ3JhcGg.) graphs the rate of decay of carbon-14.

## Radiometric Dating

The rate of decay of unstable isotopes can be used to estimate the absolute ages of fossils and rocks. This type of dating is called **radiometric dating**.

### Carbon-14 Dating

The best-known method of radiometric dating is **carbon-14 dating**. A living thing takes in carbon-14 (along with stable carbon-12). As the carbon-14 decays, it is replaced with more carbon-14. After the organism dies, it stops taking in carbon. That includes carbon-14. The carbon-14 that is in its body continues to decay. So the organism contains less and less carbon-14 as time goes on. We can estimate the amount of carbon-14 that has decayed by measuring the amount of carbon-14 to carbon-12. We know how fast carbon-14 decays. With this information, we can tell how long ago the organism died.

Carbon-14 has a relatively short half-life. It decays quickly compared to some other unstable isotopes. So carbon-14 dating is useful for specimens younger than 50,000 years old. That’s a blink of an eye in geologic time. But radiocarbon dating is very useful for more recent events. One important use of radiocarbon is early human sites. Carbon-14 dating is also limited to the remains of once-living things. To date rocks, scientists use other radioactive isotopes.

### Other Radioactive Isotopes

The isotopes in **Table** [below](https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.3/#x-ck12-SXNvdG9wZS1Sb2NrLURhdGluZw..) are used to date igneous rocks. These isotopes have much longer half-lives than carbon-14. Because they decay more slowly, they can be used to date much older specimens. Which of these isotopes could be used to date a rock that formed half a million years ago?

| **Unstable Isotope** | **Decays to** | **At a Half-Life of (years)** | **Dates Rocks Aged (years old)** |
| --- | --- | --- | --- |
| Potassium-40 | Argon-40 | 1.3 billion | 100 thousand – 1 billion |
| Uranium-235 | Lead-207 | 700 million | 1 million – 4.5 billion |
| Uranium-238 | Lead-206 | 4.5 billion | 1 million – 4.5 billion |

Plate Tectonics

How do moving plates change Earth’s crust?

Some background….

A **continent** is a large landmass.

A **boundary** is the point or line where one region begins ends and another begins.

The **crust** is the outer layer of Earth.

Alfred Wegner (VAY guhnur) German scientist who hypothesized that all the continents were once joined together as a single landmass and have since slowly drifted apart.

This is known as continental drift.

You know the single landmass as Pangaea.

The Theory of Plate Tectonics

What is the Theory of Plate Tectonics?

What is the Theory of Plate Tectonics?

The theory of plate tectonics states that Earth’s plates are in slow, constant motion, driven by convection currents in the mantle. Plate tectonics explains the formation, movement, and subduction of Earth’s plates.

Earth’s outer shell (lithosphere) is like the broken pieces of a hard, boiled egg, separated by cracks. The broken pieces on Earth are the tectonic plates. The cracks are the boundaries.

WAIT! What’s subduction again?

It’s the process by which the ocean floor sinks beneath a deep ocean trench and back into the mantle again. Remember, sea floor spreading begins at a mid-ocean ridge and circulates like a conveyer belt to a deep ocean trench.

What is life?

All living things...

•Have a cellular organization

•Contain similar chemicals

•Use energy

•Respond to their surroundings

•grow and develop

•reproduce

Plant and Animal Cells

Humans Cells

Humans are made up of 200 different types of cells and have trillions of cells in their bodies!

Cells

Cells can only be seen with a microscope.

How were cells discovered?

The Cell Theory

1. All living things are made of cells
2. All of the processes of life take places in cells

**---**Cells take in oxygen, give off carbon dioxide, and make the energy you need.

1. New cells come from existing cells.

All living organisms are classified into 5 different kingdoms:

1. Kingdom of Protists (e.g. algae…)
2. Kingdom of Monerans (e.g. bacteria…)
3. Kingdom of Fungi (e.g. mushrooms, yeast…)
4. Kingdom of Plants (e.g. conifer tree, moss…)
5. Kingdom of Animals (e.g. horse, insects…)

Let’s look closely at the different part in plant and animal cells: ( helpful link--- <https://www.youtube.com/watch?v=PHTvqW7CzXY> )

Plant Cells

A cell wall surrounds the plant cell

* It protects the cell
* Helps cells stick to each other and give the plant its shape.
* The stiff cell walls of the plant to prevent the shape from changing
* Cell wall is like the plant’s skeleton

Plant Cell

The cell membrane allows water and nutrients to pass into the cell

* Also allows waste to pass out of the cell
* Stops some materials from coming inside and injuring it.

Plant Cells

Nucleus---located in the center of the cell and controls the cell’s growth (the brain)

* Contains the plant’s genes (tells the plant what it is)

Plant Cell

Green chloroplasts produce food for the plant

* Combine sunlight, water, and carbon dioxide from the air to produce sugars.
* The sugars give the plant energy to grow and bloom
* They are green because they contain chlorophyll (absorbs and takes in energy from the sun)

Plant Cells

The rest of the plant cell is filled with cytoplasm.

* Jelly-like substance
* Helps to keep all organelles in place
* Much of the cell’s work takes place here

*Organelles: tiny cell structures that carry out specific functions in the cell*

Mitochondria

* Performs cell respiration
* Combines glucose and oxygen to form water and carbon dioxide
* Provides energy for the cell

Other Organelles

Vacuoles

* Storage bubbles found in cell
* Vacuoles might store food or any variety of nutrients a cell might need to survive
* They can even store waste products so the rest of the cell is protected from contamination. Eventually, those waste products will be sent out of the cell.

Chromosomes

* They carry all of the information used to help a cell grow, thrive, and reproduce.
* Chromosomes are made up of DNA in patterns called genes. Your genes make you who you are.

More Organelles include:

Nuclear membrane, Endoplasmic Reticulum, Ribosomes, etc.

Animals Cells

Animal and plant cells have some of the same parts

* Cell Membrane—allows materials to move in and out
* Nucleus—controls the cell’s growth and contains its genes
* Cytoplasm—jelly-like substance that surrounds the nucleus

**Animal cells do NOT have cell walls…**

Without cell walls, animal cells can take on different shapes. For example, nerve cells, muscle cells, blood cells….These different kinds of cells have allowed animals to develop muscles, bones, and nerves…This gives animals the ability to move from place to place unlike plants.

All in all, animal cells are smaller than plant cells; need a microscope to see both (see useful link for more comparisons <https://studyjams.scholastic.com/studyjams/jams/science/plants/plant-cells.htm>)

Introduction to the Human Body

Big Question: How Does your Body Work?

How do the different body parts work together?

* Each part plays a special role, so once one task is accomplished, then the next part can perform its role.

What happens if one of the parts is missing?

* For example, if the teeth were missing, then it would be difficult if not impossible to chew some food, and if one couldn’t chew something large to get it small enough to pass through the esophagus, they could choke.

The smooth functioning of your body is due partly to how the body is organized.

Body Organization

Cell tissue organ organ system

organism

Cells = Smallest unit of organization of your body.

A cell is the basic unit of structure and function in a living thing.

The human body is made up of about 100 trillion, mostly microscopic, cells

Structures of Cells: We know that cells have parts, or structures, that make a cell a cell. Some examples include....nucleus, cell membrane, cytoplasm, mitochondria, vacuoles

Functions of Cells: Each structure has a specific function, or job. These functions help keep the cell, and therefore the organism, alive. Some examples include using digested food to release energy the cell can use, cell growth, cell reproduction, and getting rid of waste.

Tissues

A tissue if a group of similar cells that perform the same function.

Examples:

Muscle Tissue can contract, or shorten. Makes parts of your body move.

Nervous Tissue directs and controls the process of movement by carrying electrical messages back and forth between the brain and other parts of the body

Connective Tissue provides support for your body and connects all its parts—for example, bone tissue and fat tissue.

Epithelial Tissue covers the surface of your body inside and out. Skin protects the delicate structures that lie beneath it. The lining of your digestive system allows you to digest food and absorb its nutrients.

Organs

An organ is a structure that is made up of different kinds of tissue. An organ performs a specific job.

Your heart is an organ that is made up of different kinds of tissues that have different functions.

Organ Systems:

An organ system is a group of organs that work together, carrying out major functions.

The major organ systems in your body are:

•Skeletal system

•Integumentary system

•Muscular system

•Circulatory system

•Respiratory system

•Digestive system

•Excretory system

•Nervous system

•Endocrine system

•Reproductive system

Science is fun! All Systems Go! (Review this helpful link: <http://sciencenetlinks.com/afterschool-resources/all-systems-go/>)

The Skeletal System

Remember that an organ system is a group of organs that work together, carrying out major functions. The SKELETAL SYSTEM is an organ system.

It has 5 Major functions:

1) Provides shape and support to the human body.

2) Enables you to move.

3) Protects your organs.

4) Produces blood cells.

5) Stores minerals and other materials until your body needs them.

1. Your skeleton gives you shape and support (There are 206 bones in the body…)
2. Your skeleton enables you to move

•Most of the body’s bones are associated with muscles, which pull the bones to the side.

•JOINTS allow your bones to move in different ways. A JOINT is a place where two bones come together.

You have two types of joints: immovable and moveable

-Immovable joints connect bones but allow little or no movement (ex: your skull)

-Movable joints are held together by ligaments which are made of strong connective tissue. They allow connected bones to move in different ways.

1. Your skeleton protects your organs
2. Your skeleton produces blood cells

•For example, tissues in the long bones of your arms and legs make certain blood cells.

1. Your skeleton stores substances that your body needs

•Bones store minerals such as calcium. When the body needs these minerals, the bones release small amounts of them into the blood

What are the characteristics of bones?

•Bones are complex living structures that grow, develop, and repair themselves. BONES ARE ALIVE!

-They are made up of bone tissue, blood vessels, and nerves.

•Bones are strong and lightweight

.-Parts of longer bones are spongy bone.

-Compact bone is hard and more dense

.-Bones contain connective tissue inside them called marrow. Red marrow produces most of your blood cells. Yellow marrow stores fat.

-Bones can absorb more force without breaking than concrete or granite rock can.

•A balanced diet and regular exercise are important for healthy bones

The Muscular System

What muscles are in your body?

Involuntary muscles

Muscles that are not under your conscious control. Some examples include the muscles that control your breathing, digestion, and heart beat

Voluntary muscles

Muscles that are under your conscious control. Some examples include the muscles needed to smile, write your name with a pencil, or get out of your seat at the end of class. What are some other examples of things you do that use voluntary muscles?

Types of muscle tissue

Your body has skeletal, smooth, and cardiac muscle tissues. Some of these muscle tissues are involuntary and some are voluntary.

Skeletal muscles

-provide the force that moves your bones-tendons attach the muscle to bone, it’s a strong connective tissue-they are striated (appear banded)-react quickly, tire quickly-they are voluntary muscles

Smooth muscles

-involuntary muscles that are not striated-control certain movements inside your body-reacts slowly and tires slowly-example: your digestive system

Cardiac muscles

-found only in your heart-it is striated-it is involuntary-it does not tire and contracts over and over—these are your heartbeats.

The Circulatory System

In the average human, about 2,000 gallons (7,572 liters) of blood travel daily through about 60,000 miles (96,560 kilometers) of blood vessels. An average adult has 5 to 6 quarts (4.7 to 5.6 liters) of blood, which is made up of plasma, red blood cells, white blood cells and platelets.

In addition to blood, the circulatory system moves lymph, which is a clear fluid that helps rid the body of unwanted materials.

In the average human, about 2,000 gallons (7,572 liters) of blood travel daily through about 60,000 miles (95,560 kilometers) of blood vessels.

Helpful Website: Overview of Circulatory System… <https://www.youtube.com/watch?v=NF68qhyfcoM>

What Does the Circulatory System Do?

The circulatory system is made up of blood vessels that carry blood away from and towards the heart. Arteries carry blood away from the heart. Veins carry blood back to the heart. The circulatory system carries oxygen, nutrients, and hormones to cells, and removes waste products, like carbon dioxide. These roadways travel in one direction only, to keep things going where they should.

What Does the Heart Do?

The heart is a pump, usually beating about 60 to 100 times per minute. With each heartbeat, the heart sends blood throughout our bodies, carrying oxygen to every cell. After delivering the oxygen, the blood returns to the heart. The heart then sends the blood to the lungs to pick up more oxygen.

This cycle repeats over and over again.

What Are the 3 Functions of the Circulatory System?

The cardiovascular system consists of the heart, blood vessels, and blood. This system has three main functions:

1) Transport of nutrients, oxygen, and hormones to cells throughout the body and removal of metabolic wastes (like carbon dioxide)

2) Protection of the body. Parts like white blood cells that circulate in the blood and defend the body. Your blood also contains clotting mechanisms that protect the body from blood after injuries.

3 Regulation of body temperature and water content of cells.

Respiratory System

The human respiratory system is a series of organs responsible for taking in oxygen and expelling carbon dioxide.

The respiratory system is responsible for taking in oxygen for cells to use. It also eliminates the waste product carbon dioxide. How does the oxygen get to the cells that need it? And how does the body get rid of carbon dioxide that cells do not need? What other body system is necessary for this to happen?

The Digestive System

Function:

* Prepares food to be used by the cells by breaking it down

Remember…

Essential functions of life include:

•obtaining food and other nutrients (water, oxygen, minerals),

•releasing energy from food,

•removing wastes,

•responding to stimuli,

•maintaining internal conditions

and growing /developing

Digestion involves the breakdown of food into smaller and smaller components, until they can be absorbed and used by the body.

Digestion allows us to use food for energy.

The Excretory System

The function of the excretory system is to excrete, or get rid of, waste from the body.

Different organs excrete different wastes such as:

•Carbon dioxide

•Salts

•Excess water

•Solid waste

•Note: your Digestive System gets rid of solid waste (poop). Your Excretory System gets rid of liquid waste (pee and sweat). It’s not gross...it’s your body systems working together!

The Excretory System:

Liver kidney lungs skin

The Nervous System

It’s like your body’s electrical wiring or a highway along which your brain sends and receives information about what is happening in the body and around it. This highway is made up of billions of nerve cells, or neurons which join together to make nerves.

The nervous system is made up of the brain, the spinal cord, and a large network of nerves that covers all parts of the body. Together the nervous system helps different parts of our body communicate and allows our brain to control what is going on.

Take a look at part of the introduction to the nervous system. <https://www.pbs.org/video/science-trek-nervous-system/>

Part of your nervous system sends the information coming from all your senses, touch, vision, hearing, taste, smell and position to your muscles. Another part of your nervous system is responsible for making sure that all the automatic things that your body needs to do to keep you going, like breathing, digesting, and your heart beat, keep happening.

Helpful Links:

<http://sciencenetlinks.com/afterschool-resources/all-systems-go/>

An excellent online interactive activity to help teachers/students explore the inside of the human body.

<https://studyjams.scholastic.com/studyjams/jams/science/plants/plant-cells.htm>

Designed primarily to study plant cells. A great slide show.

<https://www.ck12.org/book/ck-12-earth-science-for-middle-school/section/11.2/>

Earth science at its best. Relatives Ages of Rocks.

<https://www.ixl.com/science/grade-6>

IXL offers more than 100 Sixth grade science skills to explore and learn!

<https://www.sciencefun.org/>

Brings “hands-on, mind-on” interactive science programming to thousands of children every year.

<https://www.khanacademy.org/>

Excellent

<https://njctl.org/materials/courses/5th-grade-science/>

A wealth of online science resources

<https://www.learner.org/series/interactive-dynamic-earth/>

Learn what causes earthquakes, volcanoes, and more

<https://www.weareteachers.com/best-science-websites/#earth>

Best science websites for all

\*\*\*\*\*\*\*\*\*