

# What Your Child Will Learn in Middle School Science

The following chart identifies the units to be taught during each quarter. Due to the variation of materials and the configuration of teachers assigned to teach science, the order of units within a grading period may vary from teacher to teacher within a grade level at a school.

<b>GRADE 8</b>  Explaining Change on a Global Scale	1 <sup>st</sup> Quarter LS4.A – Evidence of Common Ancestry and Diversity	2 <sup>nd</sup> Quarter LS4.D – Biodiversity and Humans	2 <sup>nd</sup> /3 <sup>rd</sup> Quarter ESS3.C – Human Impacts on Earth Systems	3 <sup>rd</sup> Quarter ESS1.A – The Universe and Its Stars	4 <sup>th</sup> Quarter Biodiversity on School sites (MARA+)
	LS4.B – Natural Selection	LS2.C – Ecosystem Dynamics, Functioning and Resilience	ESS3.A – Natural Resources ESS3.D – Global Climate Change	ESS1.B – Earth and Its Solar System	Culminating Projects....
LS4.C – Adaptations					

## LS4.A: EVIDENCE OF COMMON ANCESTRY AND DIVERSITY

Fossils are mineral replacements, preserved remains, or traces of organisms that lived in the past. Thousands of layers of sedimentary rock not only provide evidence of the history of Earth itself but also of changes in organisms whose fossil remains have been found in those layers. The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. Because of the conditions necessary for their preservation, not all types of organisms that existed in the past have left fossils that can be retrieved. Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully formed anatomy.

## LS4.B: NATURAL SELECTION

Genetic variations among individuals in a population give some individuals an advantage in surviving and reproducing in their environment. This is known as natural selection. It leads to the predominance of certain traits in a population and the suppression of others. In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring.

## LS4.C: ADAPTATIONS

Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. In separated populations with different conditions, the changes can be large enough that the populations, provided they remain separated (a process called reproductive isolation), evolve to become separate species.

## LS4.D: BIODIVERSITY AND HUMANS

Biodiversity is the wide range of existing life forms that have adapted to the variety of conditions on Earth, from terrestrial to marine ecosystems. Biodiversity includes genetic variation within a species, in addition to species variation in different habitats and ecosystem types (e.g., forests, grasslands, wetlands). Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.

## LS2.C: ECOSYSTEM DYNAMICS, FUNCTIONING AND RESILIENCE

Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all of its populations. Biodiversity describes the variety of species

found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

### ESS3.C: HUMAN IMPACTS ON EARTH SYSTEMS

Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of many other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

### ESS3.A: NATURAL RESOURCES

Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geological processes (link to ESS2.B). Renewable energy resources, and the technologies to exploit them, are being rapidly developed.

### ESS3.D: GLOBAL CLIMATE CHANGE

Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.

### ESS1.A: THE UNIVERSE AND ITS STARS

Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. The universe began with a period of extreme and rapid expansion known as the Big Bang. Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.

### ESS1.B: EARTH AND THE SOLAR SYSTEM

The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. This model of the solar system can explain tides, eclipses of the sun and the moon, and the motion of the planets in the sky relative to the stars. Earth's spin axis is fixed in direction over the short term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year.