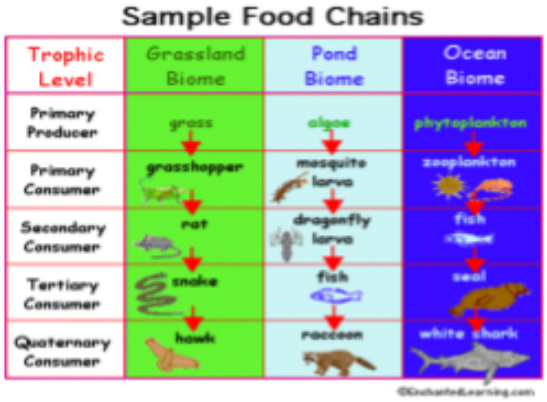
5th Grade: Matter and Its Interactions
Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means. Ex: saltwater

Motion and Stability: Forces and Interactions
Gravitational force exerted by Earth on objects is directed down toward the center of Earth. Evidence that indicates that the Earth's shape is spherical For example: observation of ships sailing beyond the horizon.

Organization for Matter and Energy Flow in Organisms
All organisms need **energy** to live, grow, and reproduce.
Plants acquire their material for growth chiefly from air and water. Emphasis is on the idea that **matter** that is not food (such as air, water, decomposed materials in soil) is changed by plants into matter that is food.

The role an organism serves in an ecosystem can be described by the way in which it gets its energy.
Sun– producers— consumers— decomposers and detritivores *(food chain vs web) A food web describes the organisms in a particular ecosystem found in interconnecting food chains using pictures or words and arrows.*
Food webs describe the complex patterns of energy flow in an ecosystem by modeling who consumes whom or what.
Producers: *Plants are called producers because they are able to use light energy from the sun to produce food (sugar) from carbon dioxide in the air and water.*
Consumers *cannot make their own food so they must eat plants and/or other animals. Animals are an example of consumers. There are three main groups of consumers.*
Herbivores *eat only producers.*
Carnivores *eat only consumers. Scavenger A carnivore that feeds on the bodies of dead or injured organisms*
Omnivores *eat both producers and consumers.*
Tertiary Consumer *An organism that eats secondary consumers*
Decomposers *generally refer to microorganisms like bacteria, protists, or fungi that use saprotrophic feeding to derive nutrients through extracellular digestion, rather than oral ingestion. (FBI!!! Fungi bacteria inverts!)*
Detritivores: *Organisms that feed on detritus or organic waste. They play an important role in the ecosystem by breaking down the dead and decaying animals and recycling nutrients.*
In a terrestrial environment, detritivores are usually invertebrate insects like beetles, butterflies, and dung flies; in mollusks, you see them as snails and slugs, in addition to soil-dwelling millipedes, centipedes, and woodlice.
In aquatic environments, detritivores are usually crustaceans, such as lobsters and fiddler crabs, or echinoderms, which include sea cucumbers or sea stars.
DETRITUS Should Excite Us



Here is a food web. It contains many more possibilities than the food chain and shows how each animal in a given ecosystem is connected by energy flow.

*Newly introduced species can damage the balance of an ecosystem. Ex: Invasive Species

Earth and the Solar System
The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.

Earth patterns and motion (Earth, Sun, Moon)
Revolution: Movement of Earth as it makes an orbit around the Sun in one year.
Rotation: Earth rotates around an imaginary straight line called an axis.
Gravity- force between Earth and anything on it.
Tides: *(Spring and Neap Tides- 8th grade)* * Importance of tides bringing nutrients in and out of the ecosystem

Earth's Systems
Discuss relationships between systems: for example: the major variables influencing the salt marsh-tidal creek ecosystem include the tides, salinity, sediments, air and water temperature, precipitation, and sunlight.

Biosphere: limited to plants and animals

- **Endangered**
- **Extinct**
- **Deforestation**

Geosphere: solid and molten rock, soil, and sediments
Atmosphere

- Earth's atmosphere is divided into several atmospheric layers extending from the Earth's surface outward.
- **Air pressure,** the force exerted by the gases pushing on an object, is greatest near the surface of Earth, in the troposphere.
- As altitude increases, the gravitational pull decreases which results in a decrease in air pressure.
- The two most abundant (common) gases in all the layers of the atmosphere are nitrogen and oxygen. However, trace gases (such as argon) play an insignificant role in the layers.

Hydrosphere: Over 71 percent of the Ocean Planet is covered by water, 98 percent of which is oceanic. The remaining two percent is freshwater, existing either in the form of freshwater lakes and streams, groundwater underlying the surface, or fresh water locked in the polar ice caps.

Water Distribution on Earth

- **Oceans: Seas**: large bodies of saltwater that are often connected to an ocean.
- **River**: large, flowing bodies of freshwater
- **Glaciers**: Huge sheets of ice that cover land.
- **Groundwater** (The water underground) can cause **erosion** through a process of **weathering**. In rainy regions, where there is a layer of limestone, groundwater erosion can change the shape of land

Erosion
Deposition

Water continually cycles between the atmosphere (troposphere), land, and ocean via the water cycle.
Precipitation: After condensation occurs (forming clouds), water droplets fall in various forms of precipitation (rain, snow, freezing rain, sleet, or hail) depending upon weather conditions. Temperature variations/changes within clouds and/or with the region between the cloud and Earth allows for the various forms of precipitation.
Evaporation/Transpiration: Water enters the atmosphere as water vapor through evaporation and transpiration (plants releasing water vapor). Thermal energy from the sun causes water to evaporate and/or transpire.
Condensation/Crystallization: Condensation happens in the atmosphere as water vapor rises in the atmosphere and changes to either water droplets or ice crystals. Clouds form as a result of condensation. In the atmosphere, dust particles (or any other particulates) serve as a surface for water to condense on.
Run-off: If precipitation falls on land surfaces, it always attempts to move back toward sea level as

surface-water flow or groundwater flow. The surface that receives the precipitation determines its flow back towards sea level. Examples are: 1) Water will remain on the surface when the surface is not porous or the precipitation is falling too fast for the water to sink into the ground. 2) Water will sink into the ground when the surface is porous, and there is a lot of space in the soil to hold the water.

Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Examples: Erosion of oyster beds

Discuss oyster recycling

Discuss how plants like Spartina (cordgrass), Hibiscus mosheutose (marsh hibiscus), Iva frutescens (marsh elder), creeping juniper, creeping phlox…prevent erosion