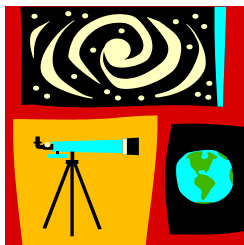


## Morton District 709 6<sup>th</sup> Grade Science Objectives



<a href="#"><u>Inquiry/Design</u></a>	<a href="#"><u>Earth Science</u></a>	<a href="#"><u>Life Science</u></a>
<a href="#"><u>Physical Science</u></a>		<a href="#"><u>Safety and Practices of Science</u></a>

### SCIENTIFIC INQUIRY/TECHNOLOGICAL DESIGN

D	11A.601 Understand how to follow procedures relating to scientific investigations including formulating hypothesis, controlling variables, collecting and recording and analyzing data, interpreting results, and reporting and displaying results.
D	11A.602 Understand the steps of the scientific method by: observing, drawing a conclusion based on observation, forming a hypothesis, conducting an experiment, organizing data, constructing and reading charts and graphs, comparing data and researching a topic as it applies. Recognize the common units of the metric system.
D	11A.603 Define a theory as an explanation or model based on observation, experimentation, and reasoning; especially one that has been tested and confirmed as a general principle helping to explain and predict natural phenomena.
D	11A.604 Define a variable as some factor which changes in different phases of an experiment. Define a constant as something kept the same in every phase of the experiment. Understand that most scientific experiments are designed so that only one variable is tested in each experiment. Identify constants and variables in described experiments.
D	11A.605 Define the control group or control setup as a group of subjects that are the same in all important ways as the subjects on which we are performing the experiment, except that the control is isolated from what we suspect to be the cause we are seeking to evaluate—the control helps to increase our certainty that the suspected cause really is the cause.

D	11A.606 Analyze patterns in data from an experiment to determine whether the information gathered helps to answer a given question or hypothesis. (e.g., all of the plants fertilized in a vegetable garden grew taller than the ones not fertilized. Understand that this is an indication that the fertilizer caused the plants to grow taller.)
D	11B.607 Apply problem-solving skills to scientific situations.
D	11B.608 Compare design solutions; select which one is best given certain restrictions on available materials, tools, cost effectiveness, and safety.
D	11B.609 Given certain tests which could be performed on a prototype, identify which one is testing for a given feature. (e.g., “Given certain tests to be performed on a car, which one is testing for its fuel efficiency?”)
D	11B.610 Identify improvements to a prototype indicated by given test results.

## EARTH SCIENCE

D	12E.676 Compare seasonal climates in major regions of the globe, considering effects of latitude, altitude, and geography.
D	12E.684 Understand that the atmosphere is a mixture of nitrogen, oxygen, argon, and trace gases that include water vapor and carbon dioxide. Understand that the atmospheric conditions vary as one changes latitude and altitude. Understand that the atmosphere consists of layers and be able to distinguish the layers and their significance. Understand that the ozone layer protects life on Earth by absorbing ultraviolet radiation from the sun.
D	12E.686 Identify weather fronts and understand how they are formed. Understand how to read and interpret weather maps.
D	12E.687 Understand patterns of atmospheric movement and how they influence weather. Understand that oceans have a major effect on climate because water in the oceans holds and distributes a large amount of heat.
M	12E.685 Understand that clouds, formed by the condensation of water vapor, affect weather and climate. Understand that clouds cause precipitation and lightning and that they insulate heat and moisture in the air.
D	12F.691 Understand that objects in the solar system are for the most part in regular and predictable motion. Know that those motions explain such phenomena as the day, the year, the phases of the moon, and eclipses.
D	12F.694 Understand that rock samples taken by astronauts walking on the moon show that Earth and moon have a common history.
D	12F.696 Understand that valleys on the surface of a planet or moon might be evidence that water is or once was there.
D	12F.697 Understand that the speed of a planet's rotation is one cause of the daily variations in temperature on its surface.

D	<p>12F.698 Understand that the cause of the Earth's seasons and the change in the amount of daylight throughout the year is the tilt of its axis of rotation with respect to the plane of its orbit. Given a diagram of the Earth depicting (1) its relative position to the sun and (2) the orientation of its axis of rotation and (3) some circle of latitude, identify the following: (a) the season of the year (if the circle of latitude is other than the equator), and (b) whether there is more daylight or more dark hours at that time of year. Understand why the seasons and daylight hours in opposite hemispheres are opposite to each other.</p>
M	<p>12F.693 Identify the differences among the planets in our solar system: the four closest planets to the sun are called the inner planets. The inner planets are small and have rocky surfaces. The five farthest planets from the sun are called the outer planets. All outer planets except Pluto are much larger than Earth, are made of gases, and have no solid surfaces.</p>
M	<p>12F.695 Understand that the tides are affected by the positions of the moon.</p>
M	<p>12F.699 Understand that the sun is an average star. Know that a solar system consists of a sun and planets and other objects that revolve around it. Know that the planets closest to the sun are hotter than the planets farther away from the sun. Understand that the color of a star depends on its temperature.</p>
M	<p>12F.6101 Define light year, how many kilometers it is, and know that galactic distances may be measured in millions and billions of light years.</p>
M	<p>12F.6102 Understand the classification of galaxies according to their properties. Understand that our solar system is within the Milky Way Galaxy.</p>

## LIFE SCIENCE

D	12A.602 Understand that all living things are composed of cells: small parts which function similarly in all living things. Understand that different tissues have different, specialized cells with specific functions. Understand the levels of organization in living organisms—cells, tissues, organs, and organ systems.
D	12A.603 Identify the main differences between plant cells and animal cells, namely that plant cells have chloroplasts and cell walls (which provide rigidity to the plant, since plants have no skeletons). Identify the basic cell organelles and their functions. <a href="http://CellsAlive.com">Cells Alive.com</a> <a href="http://PacBell.com">PacBell.com</a> -- <a href="http://PacBell.com">Plant and Animal Cells</a>
D	12A.605 Understand that the nucleus of cell contains the genetic information for the plant or animal to which it belongs.
D	12A.606 Understand that cells divide to increase their numbers, and the process of cell division called mitosis results in two daughter cells each with identical sets of chromosomes.
D	12A.607 Understand that multi-cellular organisms begin as zygotes (a single egg cell fertilized by a single sperm cell) and that a zygote grows by cell division and that as the cells multiply, they also differentiate. Understand the process of meiosis.
D	12A.610 Understand that an inherited trait can be determined by one or more genes.
D	12A.611 Understand that DNA (deoxyribonucleic acid) is the genetic material of each living thing-like a blueprint or set of instructions for building the organism-and that it is located in the chromosomes of each cell.
D	12A.612 Understand that heredity is based on the probability of inheriting a given trait for which one or both of the parents carries a gene, and that this probability can be calculated given the genetic make-up of the parents with regard to that kind of trait (e.g., blue eyes) using a Punnett Square.
D	12A.613 Understand that male animals produce sperm cells, and females produce egg cells, and that the combination of these cells results in fertilization.

M	12A.604 Understand that some organisms are unicellular, others multi-cellular. Understand that some unicellular organisms are like tiny animals, able to propel themselves or change their shape and that they are endowed with sensation.
D	12B.616 Understand that energy for life primarily derives from the sun; understand the process of photosynthesis.
D	12B.622 Understand natural selection or survival of the fittest, and understand that this is thought to be one of the explanations for how animals and plants change over time and that it was the explanation given by Charles Darwin.
D	12B.626 Understand that the number of organisms an ecosystem can support depends on the resources available and abiotic factor. (e.g., the quantity of light and water, the range of temperatures, soil composition) Know that given adequate biotic and abiotic resources and no disease or predators, populations can increase at rapid rates. Understand that lack of resources and other factors (e.g., predation, climate) limit the growth of populations in specific niches in the ecosystem.
D	12B.627 Understand that competitive feeding habits between species can have a negative effect on their populations. Understand that animals and plants compete for food, shelter, mates, and other things necessary for life and reproduction.
M	12B.624 Understand how fossils provide evidence that animals and plants have changed over time, and that new species of organisms changed over time out of older ones.
M	12B.625 Understand that three important cycles for the survival of living things in Earth's ecosystems are the carbon dioxide-oxygen cycle, the water cycle, and the nitrogen cycle.
M	12B.628 Distinguish the various members of a food web and identify order of dependence among these members.
M	12B.632 Identify and describe the major biomes and habitats and their characteristics: desert, grassland, savannah, tropical forest, coniferous forest, tundra, freshwater, and saltwater.

## PHYSICAL SCIENCE

M	12C.633 Understand that matter can be changed in different ways. 1. Physically, a change in the size, shape, or state of matter. (e.g., the melting of an ice cube, tearing of paper) 2. Chemically, where matter can change into another kind of matter. (e.g., burning of wood, rusting of iron)
M	12C.634 Define and distinguish the properties of matter: mass, weight, volume, density, color, odor, shape, texture, and hardness.
M	12C.635 Understand the phases of matter and how they depend on how the atoms and molecules of a substance move.
M	12C.636 Understand the concepts of melting point, boiling point, and freezing point, and understand the concepts of evaporation, condensation, and sublimation.
M	12C.637 Understand that there is another state of matter called plasma, which can be produced under artificial conditions on Earth. The sun's matter is in the plasma state, as is the matter of the other stars.
M	12C.638 Understand that substances can be grouped by similarities in their physical properties.
M	12C.640 Identify the properties common to most metals. (e.g., luster, malleability, ductility, the ability to conduct electricity)
M	12C.641 Identify simple compounds. (e.g., H <sub>2</sub> O NaCl)
M	12C.642 Define atom as the smallest part of an element that still has the properties of that element.
M	12C.643 Identify the 3 subatomic building blocks and their properties. Know that the electron has a negative charge, the proton has a positive charge, and the neutron is electrically neutral.

M	12C.644 Understand that a molecule is made of two or more atoms.
M	12C.645 Identify the number of different kinds of elements in a chemical formula.
M	12C.646 Understand that during a chemical change atoms are neither created nor destroyed but are rearranged to make new substances.
M	12C.647 Identify the basic properties of acids and bases. Know the relationship between acids, bases, and indicators. (e.g., blue litmus paper changes to red when placed in an acid)
M	12C.649 Understand that one form of energy is radioactivity, which includes nuclear fission and fusion, and has many beneficial uses. Recognize that the age of radioactive elements can be determined using half- life calculations.
M	12C.650 Understand that heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature (thermal equilibrium).
M	12C.651 Understand that energy can be transferred by radiation, conduction, and convection.
M	12C.652 Identify electrical conductors and insulators. Define and give examples of each. Understand that electricity can be converted into heat and light by forcing an electrical current through a conductor. Understand that this is what happens in a toaster and in a light bulb.
M	12C.653 Understand that light travels in straight lines as long as it is traveling through one uniform medium.
M	12C.654 Understand that almost all of Earth's energy comes from the sun. Understand that this energy is in the form of visible and invisible light with a range of wavelengths (electromagnetic spectrum).

M	12C.655 Understand that visible light is a small band within a very broad electromagnetic spectrum.
M	12C.656 Understand that when a light beam hits an object and is reflected off of it, the angle of incidence equals the angle of reflection.
M	12C.659 Understand that many lenses operate by refracting light beams that hit their surface in such a way that they will all meet at one point called a focal point. Understand that this is the way refracting telescopes increase the ability of an image to be magnified, and this is also how they magnify it with another lens. Likewise, know that light microscopes and magnifying glasses work in the same way.
M	12C.661 Identify the basic properties of waves: frequency, wavelength, and velocity.
M	12C.662 Understand that in the spectrum of visible light, lower frequency colors are toward red, and higher frequency colors are toward blue.
M	12C.6103 Understand that mixtures can be classified into two basic categories (heterogeneous and homogenous) and recognize that mixtures can be further subdivided within these two categories. Explain solutions and solubility.
M	12D.666 Understand that density is mass per volume, and that what is denser than something else at the same volume will have more mass, but at the same mass it will have less volume. Understand that less dense bodies have greater buoyant force in water.
M	12D.669 Distinguish between mass and weight. Know that the mass of a body remains the same regardless of where it is but that the weight of it depends on how strong the force of gravity is in its current location.

**SAFETY AND PRACTICES OF SCIENCE/SCIENCE,  
TECHNOLOGY, SOCIETY/MEASUREMENT**

D	13A.601 Identify potential hazards in the laboratory and the means of reducing them.
D	13A.602 Explain how peer review helps to assure the accurate use of data and improves the scientific process. Results from scientific investigations can be discussed.
D	13A.603 Indicate that repeatability of results is necessary for the scientific community to accept someone's findings.
D	13A.604 Understand that one set of data is not sufficient evidence for making a generalization. Identify the kind of reasoning called induction, and know that the more cases that are seen, the greater the certainty of the generalization drawn from those cases.
D	13A.605 Understand that the scientific community has a standard procedure for determining Nomenclature (naming organisms), units of measurement (metric), and ways of presenting data (scientific method).
D	13A.606 Understand that important social decisions are made on the basis of risk/benefit analysis. (e.g., whether to administer a smallpox vaccine or not)
D	13B.607 Compare the knowledge, skills, and methods of early and modern scientists.
D	13B.608 Understand that the introduction of a new technology can affect human activities worldwide.
D	13B.609 Describe how occupations use scientific and technological knowledge and skills.
D	13B.610 Analyze the interaction of resource acquisitions, technological development and ecosystem impact (the impact of human activities on our ecosystem).
D	13B.611 Compare the effectiveness of reducing, reusing, and recycling in actual situations.

D	13B.612 Analyze how policies can affect scientific advancement.
D	13B.613 Select appropriate metric scientific instruments and technological devices to take measurements, perform calculations, organize data, or make observations.