

Grade 7 Illinois Assessment Frameworks - Science

STANDARD 11A – SCIENTIFIC INQUIRY	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
<p>11.7.01 Understand how to follow procedures relating to scientific investigations including formulating hypotheses, controlling variables, collecting and recording and analyzing data, interpreting results, and reporting and displaying results.</p>			
<p>11.7.02 Distinguish among and answer questions about performing the following: observing, drawing a conclusion based on observation, forming a hypothesis, conducting an experiment, organizing data, constructing and reading charts and graphs, and comparing data. Recognize the common units of the metric system.</p>			
<p>11.7.03 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.</p>			
<p>11.7.04 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.</p>			
<p>11.7.05 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</p>			

cause.			
<p>11.7.06 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.)</p>			

STANDARD 11B – TECHNOLOGICAL DESIGN	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
11.7.07 Identify a design problem and establish criteria for determining the success of a solution.			
11.7.08 Compare design solutions; select which one is best given certain restrictions on available materials, tools, cost effectiveness, and safety.			
11.7.09 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?”).			
11.7.10 Identify improvements to a prototype indicated by given test results.			

STANDARD 12A – LIVING THINGS	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
Classification			
<p>12.7.01 Understand how scientists classify organisms. Identify common insects, flowers, birds, reptiles, and mammals using a dichotomous key.</p>			
Cell Biology			
<p>12.7.02 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.</p>			
<p>12.7.03 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.</p>			
<p>12.7.04 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.</p>			
<p>12.7.05 Understand that the nucleus of cell contains the genetic information for the plant or animal to which it belongs.</p>			
<p>12.7.06 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.</p>			
<p>12.7.07 Understand that multi-cellular organisms begin as zygotes (a single egg cell fertilized by a single sperm cell) and that a</p>			

zygote grows by cell division and that as the cells multiply, they also differentiate. Understand the process of meiosis.			
Genetics and Reproduction			
12.7.08 Understand the distinction between sexual and asexual reproduction. Understand that the offspring of sexual reproduction inherits half its genes from each parent.			
12.7.09 Understand that only some animals are capable of limb-regeneration (e.g., sea stars, some amphibians, many crustaceans).			
12.7.10 Understand that an inherited trait can be determined by one or more genes.			
12.7.11 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.			
12.7.12 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.			
12.7.13 Understand that male animals produce sperm cells, and females produce egg cells, and that the combination of these cells results in fertilization.			
12.7.14 Understand the basics of plant reproduction and define and state the purposes of pollen, ovules, seeds, and fruit.			
Botany			
12.7.15 Identify the common characteristics of plants and plant growth. Understand the purpose of various plant parts such as roots, stems, and leaves.			
12.7.16 Understand that energy for life primarily derives from the sun; understand			

the process of photosynthesis.			
12.7.17 Identify the basic anatomy of leaves: blade, vein, and petiole; classify leaves as dicot or monocot, simple or compound, and palmately compound or pinnately compound.			
12.7.18 Classify roots as either fibrous roots or tap roots.			
12.7.19 Understand that flowers are the reproductive organs of flowering plants and that their function is to produce male gametes (sperm) and female gametes (eggs) and to provide a structure for fertilization.			
12.7.20 Understand that some of the structures of flowers are adaptations that enable plants to reproduce sexually while they remain stationary. Understand that a plant's production of pollen is one such adaptation, since it can be transported (by wind, water, insects or other organisms) to the parts of the flowers that contain eggs. Know that this process is called pollination.			
12.7.21 Identify a seed as a reproductive structure consisting of a plant embryo and its stored food. Understand that in flowering plants the seeds develop in a structure called a fruit, which houses and protect seeds and may also help to disperse them to new locations.			
Change Over Time			
12.7.22 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.			
12.7.23 Understand that fossils of complete skeletons are rare, and that many skeletons have to be reconstructed based on what scientists believed the whole body to look like. Understand that the fossil record is not complete or representative of the times in which the fossilized animals and plants lived.			

12.7.24 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.			
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STANDARD 12B – ENVIRONMENT AND INTERACTION OF LIVING THINGS	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
<p>12.7.25 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.</p>			
<p>12.7.26 Understand that the number of organisms an ecosystem can support depends on the resources available and abiotic factors (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.</p>			
<p>12.7.27 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.</p>			
<p>12.7.28 Distinguish the various members of a food web and identify the order of dependence among these members.</p> <p>12.7.29 Understand that many plants depend upon certain animals for pollination and the spreading out of their seeds, and therefore to reproduce. Conversely, understand that animals depend on plants for food (either immediately, like herbivores; or intermediately, like carnivores) and shelter.</p>			
<p>12.7.30 Understand that the behavior of different organisms influences and is influenced by their environment (e.g., hunger, changes in available resources).</p>			
<p>12.7.31 Understand that animals have parts</p>			

well suited to the places they live in and to their needs.			
12.7.32 Identify and describe the major biomes and habitats and their characteristics: desert, grassland, savannah, tropical forest, coniferous forest, tundra, freshwater, and saltwater.			

STANDARD 12C – MATTER AND ENERGY	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
Properties of Matter			
<p>12.7.33 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).</p>			
<p>12.7.34 Define and distinguish the properties of matter: mass, weight, volume, density, color, odor, shape, texture, and hardness.</p>			
<p>12.7.35 Understand the phases of matter and how they depend on how the atoms and molecules of a substance move.</p>			
<p>12.7.36 Understand the concepts of melting point, boiling point, and freezing point, and understand the concepts of evaporation, condensation, and sublimation.</p>			
<p>12.7.37 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.</p>			
<p>12.7.38 Understand that substances can be grouped by similarities in their physical properties.</p>			
<p>12.7.39 Define element as a substance that cannot be broken down into simpler substances by chemical interactions. Understand that there are over 100 known elements that combine in many ways to form many kinds of compounds. Each element has its own number on the periodic table.</p>			
<p>12.7.40 Identify the properties common to most metals (e.g., luster, malleability, ductility, the ability to conduct electricity).</p>			

12.7.41 Identify simple compounds (e.g., H ₂ O, NaCl).			
The Atom			
12.7.42 Define atom as the smallest part of an element that still has the properties of that element.			
12.7.43 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.			
12.7.44 Understand that a molecule made of two or more atoms.			
12.7.45 Identify the number of different kinds of elements in a chemical formula.			
12.7.46 Understand that during a chemical change atoms are neither created nor destroyed but are rearranged to make new substances.			
Acids and Bases			
12.7.47 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).			
Energy			
12.7.48 Know the laws of the conservation of matter and energy. Apply the conservation of matter as a reason why the number and kinds of atoms in a chemical change remains constant.			
12.7.49 Understand that energy appears in many forms, such as heat, light, sound, chemical, mechanical, solar, nuclear, and electromagnetic energy. Understand the basic characteristics of each of these kinds of energy. Understand the nature of kinetic and potential energy.			
12.7.50 Understand that heat moves in			

predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature (thermal equilibrium).			
12.7.51 Understand that energy can be transferred by radiation, conduction, and convection.			
12.7.52 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.			
Light			
12.7.53 Understand that light travels in straight lines as long as it is traveling through one uniform medium.			
12.7.54 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).			
12.7.55 Understand that visible light is a small band within a very broad electromagnetic spectrum.			
12.7.56 Understand that when a light beam hits an object and is reflected off of it, the angle of incidence equals the angle of reflection.			
12.7.57 Understand that light travels at different speeds in different materials. Understand that this is why light refracts—or changes direction—namely because it goes from one material in which it moves at one speed into another material through which it moves at a different speed.			
12.7.58 Understand that the angle of refraction is determined by (1) the angle of incidence and (2) the index of refraction of the new material which the light is entering.			

<p>12.7.59 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.</p>			
<p>12.7.60 Understand that light has a dual nature—exhibiting particle properties and also wave properties—depending on the situation.</p>			
<p>12.7.61 Identify the basic properties of waves: frequency, wavelength, and velocity.</p>			
<p>12.7.62 Understand that in the spectrum of visible light, lower frequency colors are toward red, and higher frequency colors are toward blue.</p>			
<p>STANDARD 12D – FORCE AND MOTION</p>			
<p>12.7.63 Understand the concept of force as any influence that tends to accelerate an object. Know that a force, for example, can speed up an object, or slow it down, or change its direction. Understand that forces can be measured in various ways. Understand how to calculate the acceleration of an object.</p>			
<p>12.7.64 Identify and understand Newton’s laws of motion. The first law of motion states that things at rest or in motion tend to stay at rest or continue in motion unless some force is applied to them. Newton’s second law of motion (force = mass × acceleration) shows how force, mass, and acceleration are related. The third law states that for every action there is an equal and opposite reaction.</p>			
<p>12.7.65 Understand the concept of work. A force acting through distance is work. Recognize applications of simple machines</p>			

(wedge, lever, inclined plane, pulley, screw, and wheel and axle) in common tools.			
12.7.66 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.			
12.7.67 Understand that the gravitational force between two bodies decreases as the bodies get farther apart from each other. Know that the gravitational force between two bodies decreases as their masses decrease.			
12.7.68 Understand how to calculate average speeds, given the distance traveled and the time taken.			
12.7.69 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.			

STANDARD 12E – EARTH SCIENCE	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
The Earth's Structure			
<p>12.7.70 Understand that lithospheric plates constantly move at rates of centimeters per year in response to movements in the mantle. Understand that major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions. Understand that over very long periods of time (millions of years), old mountains wear down, but new ones arise from catastrophic volcanic and earthquake activity.</p>			
<p>12.7.71 Understand that land forms are the result of combination of constructive and destructive forces. Understand that constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, whereas destructive forces include weathering and erosion.</p>			
<p>12.7.72 Understand that soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Understand that soils are often found in layers, with each having a different chemical composition and texture.</p>			
<p>12.7.73 Understand that glaciers can move at a rate of centimeters per year (sometimes faster), and that in the past, glacial movement has carved new geological features on various continents.</p>			
<p>12.7.74 Understand that radioactive elements are useful for dating materials because the time it takes for the atoms in them to break apart is known. Know that this information can be used to determine the age of a rock within a certain number of years.</p>			
<p>12.7.75 Understand that there are strata (layers) in many places in the crust of the earth. Understand that the crust of the earth is</p>			

<p>mostly igneous/metamorphic, with a relatively thin veneer of sedimentary rock layers in many, but not all places. Understand the principle of superposition: in a layered sedimentary sequence, the oldest rocks are usually at the bottom.</p>			
<p>The Earth's Dynamic Processes</p>			
<p>12.7.76 Compare seasonal climates in major regions of the globe, considering effects of latitude, altitude, and geography. (e.g., 1. Higher altitude generally means colder temperatures and lower air pressure; 2. Places along the equator have a 12-hour day and a 12-hour night every day of the year and do not have strict seasons; 3. Places along latitudes between the equator and one of the earth's poles have seasons and differing amounts of daylight throughout the year: they have a longest day, a shortest day, and two equinoxes on which the daylight lasts for 12 hours; 4. Places along the Arctic and Antarctic circles have one day of exactly 24-hour daylight and one day of exactly 24-hour darkness each year).</p>			
<p>12.7.77 Understand that the solid Earth is layered with a crust, under which is a hot convecting mantle, and that at the center of the earth is a dense, metallic core.</p>			
<p>12.7.78 Understand that some changes in the solid earth can be described as the rock cycle: rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and thus the rock cycle continues. Identify the three basic kinds of rock. Igneous rock is the result of cooled magma; granite, pumice, and scoria are examples. Sedimentary rock is the result of fine particles from eroded rocks being re-deposited by water or wind; sandstone and limestone are examples. Metamorphic rock is the result of rocks being changed by high temperatures and/or pressures; marble is an</p>			

example.			
12.7.79 Understand that the theory of plate tectonics explains the formation and movement of the earth's plates. Understand that the similar contours of the continents, seafloor spreading, and the location of frequent earthquakes and volcanoes provide evidence for plate tectonics.			
12.7.80 Understand that movements of the earth's continental and oceanic plates have affected the distribution of living things on Earth. Understand that major earthquake and volcanic activity can give rise to new mountain ranges, severing different species from each other, which from then on undergo independent lines of gradual change, each adapting to its own, new ecosystem.			
12.7.81 Understand that changes in climate (e.g., the ice ages) have affected the distribution of living things on Earth. A change in climate from warm to cold might force many animals to move closer to the equator in order to survive. Identify dynamic forces that affect land and water distributions between solid Earth, oceans, atmosphere, and organisms.			
12.7.82 Understand that geologic layers and radioactive dating of rocks and meteorites provide evidence that the earth is about 4.6 billion years old, and that life has existed on Earth for over 3 billion years. Understand how to use a geologic time table.			
12.7.83 Understand that life on Earth has been changed by major catastrophes (e.g., the impacts of asteroids, volcanic eruptions).			
The Atmosphere			
12.7.84 Understand that the atmosphere is a mixture of nitrogen, oxygen, argon, and trace gases that include water vapor and carbon dioxide. Understand that 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.			
12.7.85 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.			
12.7.86 Understand how jet streams affect weather. Identify weather fronts and understand how they are formed. Understand how to read and interpret weather maps.			
12.7.87 Understand patterns of atmospheric movement and how they influence weather. Understand that oceans have a major affect on climate because water in the oceans holds and distributes a large amount of heat.			
Water			
12.7.88 Understand the stages in the water cycle on Earth: evaporation, condensation, and precipitation.			
12.7.89 Understand that water below the surface is groundwater and it forms when precipitation moves slowly downward through rocks and soil.			
12.7.90 Know that about three fourths of the earth is covered with water. Understand that most of the earth's water is salt water (oceans), and only about 3 percent of the earth's water is freshwater. Know that freshwater is found mainly in icecaps, glaciers, lakes, groundwater, rivers, and the atmosphere.			

STANDARD 12F – ASTRONOMY	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
<p>12.7.91 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.</p>			
<p>12.7.92 Understand that gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Know that changes in gravitational forces explain the phenomenon of the tides. Know that what an object weighs on Earth is different than what it weighs on the moon or other planets in our solar system. This is due to gravity.</p>			
<p>12.7.93 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>			
<p>12.7.94 Understand that rock samples taken by astronauts walking on the moon show that the earth and moon have a common history.</p>			
<p>12.7.95 Understand that because it takes the moon the same amount of time to rotate on its axis as it does to revolve around the earth, the same side of the moon always faces the earth. Understand that the tides are affected by the positions of the moon.</p>			
<p>12.7.96 Understand that valleys on the surface of a planet or moon might be evidence that water is or once was there.</p>			
<p>12.7.97 Understand that the speed of a planet's rotation is one cause of the daily variations in temperature on its surface.</p>			

<p>12.7.98 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>			
<p>12.7.99 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>			
<p>12.7.100 Identify the relative positions of the earth, moon, and sun when the moon appears full, new, half, and when a lunar or solar eclipse occurs. Given a diagram of the sun and the earth in some definite position with its axis of rotation drawn (and with the poles labeled), identify the earth in the positions of summer solstice, winter solstice, spring equinox, and fall equinox (for the northern hemisphere).</p>			
<p>12.7.101 Define light year, how many kilometers it is, and know that galactic distances may be measured in millions and billions of light years.</p>			

STANDARD 13A – SAFETY AND PRACTICES OF SCIENCE	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
13.7.01 Identify potential hazards in the laboratory and the means of reducing them.			
13.7.02 Explain how peer review helps to assure the accurate use of data and improves the scientific process. Results from scientific investigations can be discussed.			
13.7.03 Indicate that repeatability of results is necessary for the scientific community to accept someone's findings.			
13.7.04 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.			
13.7.05 Understand that the scientific community has a standard procedure for determining nomenclature, units of measurement, and ways of presenting data.			
13.7.06 Understand that important social decisions are made on the basis of risk/benefit analysis (e.g., whether to administer a smallpox vaccine or not).			

STANDARD 13B – SCIENCE, TECHNOLOGY, SOCIETY	Related Textbook pages	Related Additional Resources and Activities	Assessment Items
13.7.07 Compare the knowledge, skills, and methods of early and modern scientists.			
13.7.08 Understand that the introduction of a new technology can affect human activities worldwide.			
13.7.09 Describe how occupations use scientific and technological knowledge and skills.			
13.7.10 Analyze the interaction of resource acquisitions, technological development and ecosystem impact.			
13.7.11 Compare the effectiveness of reducing, reusing, and recycling in actual situations.			
13.7.12 Analyze the effects of policies on science and technology issues.			
Measurement			
13.7.13 Select appropriate scientific instruments and technological devices to take measurements, perform calculations, organize data, or make observations.			