

IA_Core Curriculum - Science (2009)

Intermediate

Strand 1 Science as Inquiry

Concept 1.1 Identify and generate questions that can be answered through scientific investigations.

Skill 1.1.1 Students ask questions that they can answer with scientific knowledge combined with their own observations.

Skill 1.1.2 Students recognize that different questions lead to different types of investigations.

Concept 1.2 Recognize that scientists perform different types of investigations.

Skill 1.2.1 Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting), depending on the types of questions they want to answer.

Concept 1.3 Plan and conduct scientific investigations.

Skill 1.3.1 Students should engage in systematic observation, making accurate measurements, and identifying and controlling variables.

Skill 1.3.2 Students understand the concept of a fair test.

Skill 1.3.3 Students follow appropriate safety procedures when conducting investigations.

Concept 1.4 Use appropriate tools and techniques to gather, process, and analyze data.

Skill 1.4.1 Students enhance their skills with tools such as rulers, thermometers, balances, spring scales, magnifiers and microscopes.

Skill 1.4.2 Students are introduced to the use of computers and calculators for conducting investigations.

Skill 1.4.3 Students' use of appropriate tools is guided by the questions asked and the investigations students design.

Concept 1.5 Incorporate mathematics in science inquiries.

Skill 1.5.1 Mathematics is used to gather, organize and present data and to construct convincing explanations.

Concept 1.6 Use evidence to develop reasonable explanations.

Skill 1.6.1 Students should determine what constitutes evidence.

Skill 1.6.2 Students should judge the merits or strengths of the data and information used to make explanations.

Skill 1.6.3 Students' explanations should reflect the evidence they have obtained in their investigations.

Skill 1.6.4 Students should check their explanations against scientific knowledge, their own experiences, and observations of others.

Concept 1.7 Communicate scientific procedures and explanations.

Skill 1.7.1 Students should communicate, critique, and analyze their work and the work of other students.

Skill 1.7.2 Students should share procedures and explanations through various means of communication.

Concept 1.8 Follow appropriate safety procedures when conducting investigations.

Strand 2 Earth and Space

Concept 2.1 Understand and apply knowledge of properties and uses of earth materials.

Skill 2.1.1 The different physical and chemical properties of earth materials make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as foods.

Concept 2.2 Understand and apply knowledge of processes and changes on or in the earth's land, oceans, and atmosphere.

Skill 2.2.1 The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes such as landslides, volcanic eruptions, floods and earthquakes.

Concept 2.3 Understand and apply knowledge of fossils and the evidence they provide of past life on earth.

Skill 2.3.1 Fossils provide evidence of plants and animals that lived long ago and the nature of the environment at that time.

Concept 2.4 Understand and apply knowledge of weather and weather patterns.

Skill 2.4.1 Weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed and precipitation.

Skill 2.4.2 Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather.

Concept 2.5 Understand and apply knowledge of the properties, movements, and locations of objects in our solar system.

Skill 2.5.1 Most objects in the solar system are in regular and predictable motion. The rotation of the earth on its axis every 24 hours produces the day-and-night cycle. To people on the earth this turning of the planet makes it seem as though the sun, planets, and stars are orbiting the earth once a day.

Skill 2.5.2 The sun appears to move across the sky in the same way every day. Its apparent path changes slowly across the seasons.

Skill 2.5.3 The moon's orbit around the earth once in about 28 days changes what part of the moon is lighted by the sun and how much of that part can be seen from the earth – the phases of the moon.

Skill 2.5.4 Eight planets and many other objects revolve around our Sun in predictable patterns. These planets and objects are composed of varied materials.

Strand 3 Physical Science

Concept 3.1 Understand and apply knowledge of how to describe and identify substances based on characteristic properties.

Skill 3.1.1 It may be necessary to use magnification to observe the component parts of some materials.

Skill 3.1.2 A substance has characteristic properties. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.

Skill 3.1.3 The properties of a substance can be measured using tools and technology.

Skill 3.1.4 When a new material (compound) is made by chemically combining two or more materials, it has properties that are different from the original materials. For that reason, many different materials can be made from a small number of basic materials.

Concept 3.2 Understand and apply knowledge of states of matter and changes in states of matter.

Skill 3.2.1 Materials can exist in different states – solid, liquid and gas. Some common materials can be changed from one state to another by heating or cooling.

Concept 3.3 Understand and apply knowledge of the concept of conservation of mass/matter.

Skill 3.3.1 When something is broken into parts, the parts have the same total mass as the original item.

Concept 3.4 Understand and apply knowledge of sound, light, electricity, magnetism, and heat.

Skill 3.4.1 Sound is produced when vibrations from objects travel through a medium and are received. Sound can vary in volume. The pitch of a sound can be varied by changing the rate of vibration.

Skill 3.4.2 Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by an object.

Skill 3.4.3 Electricity in circuits can produce light, heat, sound, and magnetic effects. Electricity can only flow through a closed circuit.

Skill 3.4.4 Magnets attract and repel each other and certain kinds of other materials.

Skill 3.4.5 Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.

Concept 3.5 Understand and apply knowledge of how forces are related to an object's motion.

Skill 3.5.1 The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.

Skill 3.5.2 Changes in speed or direction of motion are caused by forces. The greater the force, the greater the change in motion. The more massive an object, the less effect a given force will have in changing its motion.

Strand 4 Life Science

Concept 4.1a Structures, characteristics, and adaptations of organisms that allow them to function and survive within their habitats.

Concept 4.1b How individual organisms are influenced by internal and external factors.

Concept 4.1c The relationships among living and non-living factors in terrestrial and aquatic ecosystems.

Skill 4.1c.1 Animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.

Skill 4.1c.2 An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, others die or move to new locations.

Skill 4.1c.3 All organisms cause changes in the environment in which they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.

Concept 4.2 Understand and apply knowledge of environmental stewardship.

Skill 4.2.1 Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.

Skill 4.2.2 Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.

Concept 4.3 Understand and apply knowledge of basic human body systems and how they work together.

Skill 4.3.1 The human organism has systems which interact with one another. These systems include circulatory, respiratory, digestive, musculoskeletal, etc.

Concept 4.4 Understand and apply knowledge of personal health and wellness issues.

Skill 4.4.1 See 21st Century Skills of the Iowa Core Curriculum.