

ILLINOIS LEARNING STANDARDS 1-30 (cont.)

SCIENCE

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

Why This Goal Is Important: The inquiry process prepares learners to engage in science and apply methods of technological design. This understanding will enable students to pose questions, use models to enhance understanding, make predictions, gather and work with data, use appropriate measurement methods, analyze results, draw conclusions based on evidence, communicate their methods and results, and think about the implications of scientific research and technological problem solving.

A. Know and apply the concepts, principles and processes of scientific inquiry.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
11.A.1a Describe an observed event.	11.A.2a Formulate questions on a specific science topic and choose the steps needed to answer the questions.	11.A.3a Formulate hypotheses that can be tested by collecting data.
11.A.1b Develop questions on scientific topics.	11.A.2b Collect data for investigations using scientific process skills including observing, estimating and measuring.	11.A.3b Conduct scientific experiments that control all but one variable.
11.A.1c Collect data for investigations using measuring instruments and technologies.	11.A.2c Construct charts and visualizations to display data.	11.A.3c Collect and record data accurately using consistent measuring and recording techniques and media.
11.A.1d Record and store data using available technologies.	11.A.2d Use data to produce reasonable explanations.	11.A.3d Explain the existence of unexpected results in a data set.
11.A.1e Arrange data into logical patterns and describe the patterns.	11.A.2e Report and display the results of individual and group investigations.	11.A.3e Use data manipulation tools and quantitative (e.g., mean, mode, simple equations) and representational methods (e.g., simulations, image processing) to analyze measurements.
11.A.1f Compare observations of individual and group results.		11.A.3f Interpret and represent results of analysis to produce findings.
		11.A.3g Report and display the process and results of a scientific investigation.

B. Know and apply the concepts, principles and processes of technological design.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
11.B.1a Given a simple design problem, formulate possible solutions.	11.B.2a Identify a design problem and propose possible solutions.	11.B.3a Identify an actual design problem and establish criteria for determining the success of a solution.
11.B.1b Design a device that will be useful in solving the problem.	11.B.2b Develop a plan, design and procedure to address the problem identifying constraints (e.g., time, materials, technology).	11.B.3b Sketch, propose and compare design solutions to the problem considering available materials, tools, cost effectiveness and safety.
11.B.1c Build the device using the materials and tools provided.	11.B.2c Build a prototype of the design using available tools and materials.	11.B.3c Select the most appropriate design and build a prototype or simulation.
11.B.1d Test the device and record results using given instruments, techniques and measurement methods.	11.B.2d Test the prototype using suitable instruments, techniques and quantitative measurements to record data.	11.B.3d Test the prototype using available materials, instruments and technology and record the data.
11.B.1e Report the design of the device, the test process and the results in solving a given problem.	11.B.2e Assess test results and the effectiveness of the design using given criteria and noting possible sources of error.	11.B.3e Evaluate the test results based on established criteria, note sources of error and recommend improvements.
	11.B.2f Report test design, test process and test results.	11.B.3f Using available technology, report the relative success of the design based on the test results and criteria.

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STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

Why This Goal Is Important: This goal is comprised of key concepts and principles in the life, physical and earth/space sciences that have considerable explanatory and predictive power for scientists and non-scientists alike. These ideas have been thoroughly studied and have stood the test of time. Knowing and being able to apply these concepts, principles and processes help students understand what they observe in nature and through scientific experimentation. A working knowledge of these concepts and principles allows students to relate new subject matter to material previously learned and to create deeper and more meaningful levels of understanding.

A. Know and apply concepts that explain how living things function, adapt and change.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.A.1a Identify and describe the component parts of living things (e.g., birds have feathers; people have bones, blood, hair, skin) and their major functions.	12.A.2a Describe simple life cycles of plants and animals and the similarities and differences in their offspring.	12.A.3a Explain how cells function as “building blocks” of organisms and describe the requirements for cells to live.
12.A.1b Categorize living organisms using a variety of observable features (e.g., size, color, shape, backbone).	12.A.2b Categorize features as either inherited or learned (e.g., flower color or eye color is inherited; language is learned).	12.A.3b Compare characteristics of organisms produced from a single parent with those of organisms produced by two parents.
		12.A.3c Compare and contrast how different forms and structures reflect different functions (e.g., similarities and differences among animals that fly, walk or swim; structures of plant cells and animal cells).

B. Know and apply concepts that describe how living things interact with each other and with their environment.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.B.1a Describe and compare characteristics of living things in relationship to their environments.	12.B.2a Describe relationships among various organisms in their environments (e.g., predator/prey, parasite/host, food chains and food webs).	12.B.3a Identify and classify biotic and abiotic factors in an environment that affect population density, habitat and placement of organisms in an energy pyramid.
12.B.1b Describe how living things depend on one another for survival.	12.B.2b Identify physical features of plants and animals that help them live in different environments (e.g., specialized teeth for eating certain foods, thorns for protection, insulation for cold temperature).	12.B.3b Compare and assess features of organisms for their adaptive, competitive and survival potential (e.g., appendages, reproductive rates, camouflage, defensive structures).

C. Know and apply concepts that describe properties of matter and energy and the interactions between them.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.C.1a Identify and compare sources of energy (e.g., batteries, the sun).	12.C.2a Describe and compare types of energy including light, heat, sound, electrical and mechanical.	12.C.3a Explain interactions of energy with matter including changes of state and conservation of mass and energy.
12.C.1b Compare large-scale physical properties of matter (e.g., size, shape, color, texture, odor).	12.C.2b Describe and explain the properties of solids, liquids and gases.	12.C.3b Model and describe the chemical and physical characteristics of matter (e.g., atoms, molecules, elements, compounds, mixtures).

D. Know and apply concepts that describe force and motion and the principles that explain them.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.D.1a Identify examples of motion (e.g., moving in a straight line, vibrating, rotating).	12.D.2a Explain constant, variable and periodic motions.	12.D.3a Explain and demonstrate how forces affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects).
12.D.1b Identify observable forces in nature (e.g., pushes, pulls, gravity, magnetism).	12.D.2b Demonstrate and explain ways that forces cause actions and reactions (e.g., magnets attracting and repelling; objects falling, rolling and bouncing).	12.D.3b Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).

ILLINOIS LEARNING STANDARDS 1-30 (cont.)

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STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences (cont.)

E. Know and apply concepts that describe the features and processes of the Earth and its resources.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.E.1a Identify components and describe diverse features of the Earth's land, water and atmospheric systems.	12.E.2a Identify and explain natural cycles of the Earth's land, water and atmospheric systems (e.g., rock cycle, water cycle, weather patterns).	12.E.3a Analyze and explain large-scale dynamic forces, events and processes that affect the Earth's land, water and atmospheric systems (e.g., jetstream, hurricanes, plate tectonics).
12.E.1b Identify and describe patterns of weather and seasonal change.	12.E.2b Describe and explain short-term and long-term interactions of the Earth's components (e.g., earthquakes, types of erosion).	12.E.3b Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth (e.g., erosion, El Nino).
12.E.1c Identify renewable and nonrenewable natural resources.	12.E.2c Identify and classify recyclable materials.	12.E.3c Evaluate the biodegradability of renewable and nonrenewable natural resources.

F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
12.F.1a Identify and describe characteristics of the sun, Earth and moon as familiar objects in the solar system.	12.F.2a Identify and explain natural cycles and patterns in the solar system (e.g., order of the planets; moon phases; seasons as related to Earth's tilt, one's latitude, and where Earth is in its yearly orbit around the sun).	12.F.3a Simulate, analyze and explain the effects of gravitational force in the solar system (e.g., orbital shape and speed, tides, spherical shape of the planets and moons).
12.F.1b Identify daily, seasonal and annual patterns related to the Earth's rotation and revolution.	12.F.2b Explain the apparent motion of the sun and stars.	12.F.3b Describe the organization and physical characteristics of the solar system (e.g., sun, planets, satellites, asteroids, comets).
	12.F.2c Identify easily recognizable star patterns (e.g., the Big Dipper, constellations).	12.F.3c Compare and contrast the sun as a star with other objects in the Milky Way Galaxy (e.g., nebulae, dust clouds, stars, black holes).

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STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

Why This Goal Is Important: Understanding the nature and practices of science such as ensuring the validity and replicability of results, building upon the work of others and recognizing risks involved in experimentation gives learners a useful sense of the scientific enterprise. In addition, the relationships among science, technology and society give humans the ability to change and improve their surroundings. Learners who understand this relationship will be able to appreciate the efforts and effects of scientific discovery and applications of technology on their own lives and on the society in which we live.

A. Know and apply the accepted practices of science.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
13.A.1a Use basic safety practices (e.g., not tasting materials without permission, "stop/drop/roll").	13.A.2a Demonstrate ways to avoid injury when conducting science activities (e.g., wearing goggles, fire extinguisher use).	13.A.3a Identify and reduce potential hazards in science activities (e.g., ventilation, handling chemicals).
13.A.1b Explain why similar results are expected when procedures are done the same way.	13.A.2b Explain why similar investigations may not produce similar results.	13.A.3b Analyze historical and contemporary cases in which the work of science has been affected by both valid and biased scientific practices.
13.A.1c Explain how knowledge can be gained by careful observation.	13.A.2c Explain why keeping accurate and detailed records is important.	13.A.3c Explain what is similar and different about observational and experimental investigations.

B. Know and apply concepts that describe the interaction between science, technology and society.

EARLY ELEMENTARY	LATE ELEMENTARY	MIDDLE/JUNIOR HIGH SCHOOL
13.B.1a Explain the uses of common scientific instruments (e.g., ruler, thermometer, balance, probe, computer).	13.B.2a Explain how technology is used in science for a variety of purposes (e.g., sample collection, storage and treatment; measurement; data collection, storage and retrieval; communication of information).	13.B.3a Identify and explain ways that scientific knowledge and economics drive technological development.
13.B.1b Explain how using measuring tools improves the accuracy of estimates.	13.B.2b Describe the effects on society of scientific and technological innovations (e.g., antibiotics, steam engine, digital computer).	13.B.3b Identify important contributions to science and technology that have been made by individuals and groups from various cultures.
13.B.1c Describe contributions men and women have made to science and technology.	13.B.2c Identify and explain ways that science and technology influence the lives and careers of people.	13.B.3c Describe how occupations use scientific and technological knowledge and skills.
13.B.1d Identify and describe ways that science and technology affect people's everyday lives (e.g., transportation, medicine, agriculture, sanitation, communication occupations).	13.B.2d Compare the relative effectiveness of reducing, reusing and recycling in actual situations.	13.B.3d Analyze the interaction of resource acquisition, technological development and ecosystem impact (e.g., diamond, coal or gold mining; deforestation).
13.B.1e Demonstrate ways to reduce, reuse and recycle materials.	13.B.2e Identify and explain ways that technology changes ecosystems (e.g., dams, highways, buildings, communication networks, power plants).	13.B.3e Identify advantages and disadvantages of natural resource conservation and management programs.
	13.B.2f Analyze how specific personal and societal choices that humans make affect local, regional and global ecosystems (e.g., lawn and garden care, mass transit).	13.B.3f Apply classroom-developed criteria to determine the effects of policies on local science and technology issues (e.g., energy consumption, landfills, water quality).