

Introduction to 5-7 Grade Level Assigned Indicators

Two recommended formats for 5th, 6th, and 7th grade science indicator alignment are provided in this appendix. These formats incorporate all the Kansas State Science Standards and include: *Integrated and Standard-Specific* versions. These are only recommendations to help guide districts with curriculum alignment in science using the resources available to them.

In both formats, Standard 1 (Science as Inquiry), Standard 5 (Science and Technology), Standard 6 (Science in Personal and Environmental Perspectives), & Standard 7 (History and Nature of Science) should be taught at all grade levels. All standards, benchmarks, and indicators have been addressed in both formats.

The *integrated format* has assigned certain indicators to grade levels based on the difficulty of the indicator and other related indicators. The assigned indicators should be mastered in the assigned grade level as appropriate for the age group.

The *standard-specific format* has assigned a certain standard to a certain grade level. Fifth grade has been assigned Standard 4 (Earth and Space Science). Sixth grade has been assigned Standard 2 (Physical Science). Seventh grade has been assigned Standard 3 (Life Science).

These formats are solely recommendations. They may be changed to meet the needs of each individual district. This document is to be used in addition to the Kansas Curricular Standards for Science. They can be found on the Kansas State Department of Education website at: www.ksde.org (from the left bar select educators, standards, science).

For further assistance on each of the assessed indicators, please refer to the Science Test Items Specifications also located on the KSDE website (from the left bar select educators, assessments, science assessments, science test items specifications).

Summary of the Kansas Science Standards

STANDARD 1: SCIENCE AS INQUIRY

The student will develop the abilities to do *scientific inquiry*, be able to demonstrate how *scientific inquiry* is applied, and develop understandings about *scientific inquiry*.

STANDARD 2: PHYSICAL SCIENCE

The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces, and transfer of energy.

STANDARD 3: LIFE SCIENCE

The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms.

STANDARD 4: EARTH and SPACE SCIENCE

The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history, and earth in the solar system.

STANDARD 5: SCIENCE AND TECHNOLOGY

The student will demonstrate abilities of technological design and understandings about science and technology.

STANDARD 6: SCIENCE IN PERSONAL AND ENVIRONMENTAL PERSPECTIVES

The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment, and natural hazards.

STANDARD 7: HISTORY AND NATURE OF SCIENCE

The student will examine and develop an understanding of science as a historical human endeavor.

5th Grade Recommendations

Integrated	
2.1.1	▲ compares and classifies the states of matter; solids, liquids, gases, and plasma
2.2.2	▲ measures and graphs the effects of temperature on matter.
2.3.4	▲ investigates and explains how simple machines multiply force at the expense of distance.
2.4.1	understands the difference between potential and kinetic energy.
2.4.3	▲ observes and communicates how light (electromagnetic) energy interacts with matter: transmitted, reflected, refracted, and absorbed.
3.4.1	▲ recognizes that all populations living together (biotic resources) and the physical factors (abiotic resources) with which they interact compose an ecosystem.
3.4.2	understands how limiting factors determine the carrying capacity of an ecosystem.
3.4.3	▲ traces the energy flow from the sun (source of radiant energy) to producers (via photosynthesis – chemical energy) to consumers and decomposers in food webs.
4.3.1	▲ compares and contrasts the characteristics of stars, planets, moons, comets, and asteroids.
4.3.2	models spatial relationships of the earth/moon/planets/sun system to scale.
4.3.3	identifies past and present methods used to explore space.

5th Grade (Standard-Specific)

Standard 4: Earth and Space	
4.1.1	▲ identifies properties of the solid earth, the oceans and fresh water, and the atmosphere.
4.1.2	▲ models earth's cycles, constructive and destructive processes, and weather systems.
4.2.1	▲ understands that earth processes observed today (including movement of lithospheric plates and changes in atmospheric conditions) are similar to those that occurred in the past; earth history is also influenced by occasional catastrophes, such as the impact of a comet or asteroid.
4.3.1	▲ compares and contrasts the characteristics of stars, planets, moons, comets, and asteroids.
4.3.2	models spatial relationships of the earth/moon/planets/sun system to scale.
4.3.3	identifies past and present methods used to explore space.
4.4.1	▲ demonstrates and models object/space/time relationships that explain phenomena such as the day, the month, the year, seasons, phases of the moon, eclipses and tides.
4.4.2	describes how the angle of incidence of solar energy striking earth's surface affects the amount of heat energy absorbed at earth's surface.

6th Grade Recommendations

Integrated	
2.1.1	▲ compares and classifies the states of matter; solids, liquids, gases, and plasma
2.1.2	compares and contrasts the classes of matter; elements, compounds, and mixtures.
2.1.3	identifies and communicates properties of matter including but not limited to, boiling point, solubility, and density.
2.2.1	▲ understands the relationship of atoms to elements and elements to compounds. (Introduction only.)
2.2.2	▲ measures and graphs the effects of temperature on matter.
3.1.4	concludes that breakdowns in structure or function may be caused by disease, damage, heredity, or aging.
3.3.1	▲ understands that internal and/or environmental conditions affect an organism's behavior and/or response in order to maintain and regulate stable internal conditions to survive in a continually changing environment.
3.3.2	recognizes that the survival of all organisms requires the ingestion of materials, the intake and release of energy, growth, release of wastes and responses to environmental change.
3.5.2	▲ understands that adaptations of organisms (changes in structure, function, or behavior that accumulate over successive generations) contribute to biological diversity.
3.5.3	▲ associates extinction of a species with environmental changes and insufficient adaptive characteristics.
4.1.1	▲ identifies properties of the solid earth, the oceans and fresh water, and the atmosphere.
4.1.2	▲ models earth's cycles, constructive and destructive processes, and weather systems.
4.2.1	▲ understands that earth processes observed today (including movement of lithospheric plates and changes in atmospheric conditions) are similar to those that occurred in the past; earth history is also influenced by occasional catastrophes, such as the impact of a comet or asteroid.

6th Grade (Standard-Specific)

Standard 2: Physical Science	
2.1.1	▲ compares and classifies the states of matter; solids, liquids, gases, and plasma
2.1.2	compares and contrasts the classes of matter; elements, compounds, and mixtures.
2.1.3	identifies and communicates properties of matter including but not limited to, boiling point, solubility, and density.
2.2.1	▲ understands the relationship of atoms to elements and elements to compounds.
2.2.2	▲ measures and graphs the effects of temperature on matter.
2.3.1	identifies the forces that act on an object (e.g., gravity and friction)
2.3.2	▲ describes, measures, and represents data on a graph showing the motion of an object (position, direction of motion, speed).
2.3.3	▲ recognizes and describes examples of Newton's Laws of Motion.
2.3.4	▲ investigates and explains how simple machines multiply force at the expense of distance.
2.4.1	understands the difference between potential and kinetic energy.
2.4.2	▲ understands that when work is done energy transforms from one form to another, including mechanical, heat, light, sound, electrical, chemical, and nuclear energy, yet is conserved.
2.4.3	▲ observes and communicates how light (electromagnetic) energy interacts with matter: transmitted, reflected, refracted, and absorbed.
2.4.4	▲ understands that heat energy can be transferred from hot to cold by radiation, convection, and conduction.

7th Grade Recommendations

Integrated	
2.2.1	▲ understands the relationship of atoms to elements and elements to compounds.
2.3.1	identifies the forces that act on an object (e.g., gravity and friction)
2.3.2	▲ describes, measures, and represents data on a graph showing the motion of an object (position, direction of motion, speed).
2.3.3	▲ recognizes and describes examples of Newton's Laws of Motion.
2.4.2	▲ understands that when work is done energy transforms from one form to another, including mechanical, heat, light, sound, electrical, chemical, and nuclear energy, yet is conserved.
2.4.4	▲ understands that heat energy can be transferred from hot to cold by radiation, convection, and conduction.
3.1.1	▲ will understand the cell theory; that all organisms are composed of one or more cells, cells are the basic unit of life, and that cells come from other cells.
3.1.2	▲ relates the structure of cells, organs, tissues, organ systems, and whole organisms to their functions
3.1.3	compares organisms composed of single cells with organisms that are multi-cellular.
3.2.1	▲ differentiates between asexual and sexual reproduction of organisms.
3.2.2	understands how hereditary information of each cell is passed from one generation to the next.
3.2.3	infers that the characteristics of an organism result from heredity and interactions with the environment.
3.4.3	▲ traces the energy flow from the sun (source of radiant energy) to producers (via photosynthesis – chemical energy) to consumers and decomposers in food webs.
3.5.1	concludes that species of animals, plants, and microorganisms may look dissimilar on the outside but have similarities in internal structures, developmental characteristics, chemical processes, and genomes.
4.4.1	▲ demonstrates and models object/space/time relationships that explain phenomena such as the day, the month, the year, seasons, phases of the moon, eclipses and tides.
4.4.2	describes how the angle of incidence of solar energy striking earth's surface affects the amount of heat energy absorbed at earth's surface.

7th Grade (Standard-Specific)

Standard 3: Life Science	
3.1.1	▲ will understand the cell theory; that all organisms are composed of one or more cells, cells are the basic unit of life, and that cells come from other cells.
3.1.2	▲ relates the structure of cells, organs, tissues, organ systems, and whole organisms to their functions
3.1.3	compares organisms composed of single cells with organisms that are multi-cellular.
3.1.4	concludes that breakdowns in structure or function may be caused by disease, damage, heredity, or aging.
3.2.1	▲ differentiates between asexual and sexual reproduction of organisms.
3.2.2	understands how hereditary information of each cell is passed from one generation to the next
3.2.3	infers that the characteristics of an organism result from heredity and interactions with the environment
3.3.1	▲ understands that internal and/or environmental conditions affect an organism's behavior and/or response in order to maintain and regulate stable internal conditions to survive in a continually changing environment.
3.3.2	recognizes that the survival of all organisms requires the ingestion of materials, the intake and release of energy, growth, release of wastes and responses to environmental change.
3.4.1	▲ recognizes that all populations living together (biotic resources) and the physical factors (abiotic resources) with which they interact compose an ecosystem.
3.4.2	understands how limiting factors determine the carrying capacity of an ecosystem.
3.4.3	▲ traces the energy flow from the sun (source of radiant energy) to producers (via photosynthesis – chemical energy) to consumers and decomposers in food webs.
3.5.1	concludes that species of animals, plants, and microorganisms may look dissimilar on the outside but have similarities in internal structures, developmental characteristics, chemical processes, and genomes.
3.5.2	▲ understands that adaptations of organisms (changes in structure, function, or behavior that accumulate over successive generations) contribute to biological diversity.
3.5.3	▲ associates extinction of a species with environmental changes and insufficient adaptive characteristics.

Grade 5-7 Assessed Indicator Vocabulary

Standard 1 Inquiry	
1.1.1	untestable, testable, measurable, repeat/replicate procedure, experimental procedure
1.1.2	variables, independent, dependent, constant, control group, hypothesis, analyze, interpret, data, experimental group, procedure, conclusion, relationships, validity of results, sample size, property, mean (average), graphs, data table, diagram, graduated cylinder, meter stick, balance, spring scale, thermometer, stopwatch, hand lens, microscope, telescope, safe procedures, unsafe procedures, toxic, flammable, corrosive, explosive, radio active, units of measure: meter, liter, gram; Fahrenheit, Celsius
1.1.3	logical conclusion, evidence, relative, multiple trials, inverse and direct relationships, quantitative, qualitative, extrapolation, interpolation, rate of dissolving, multiple trials
1.1.4	results, graphical format, numerical data display, graphical organizers
1.3.2	scientific evidence: supports, not supported, contradicts; relevant, reasonable conclusion, theories, continental drift, spontaneous generation, conflict of interest/bias/unreliable, valid conclusion, opinion, source of data, flaws or omissions in a scientific report, verify a claim
Standard 2 Physical	
2.1.1	properties of matter: solid, liquid, gas; phases/states of matter, points on a graph, boiling point, melting point, substances, physical changes, volume, conservation of mass
2.2.1	atom, proton, neutron, nucleus, electron, orbit, elements, chemical properties, compounds, finite number
2.2.2	phase change graph: heating/cooling curve for water; predict, expansion, contraction, heat, physical and chemical change, dissolving, evaporating, decaying, increase, decrease, temperature is a measure of
2.3.2	motion, position, speed, force, direction, ramps, linear distance vs. time graph, 2 dimensional grid, average speeds, motion graphs, time interval, media (medium)
2.3.3	friction, Newton's Laws of Motion, inertia, vector arrows, air resistance, deviate, unbalanced forces, frictionless surface, net force, action/reaction, 1 and 2 dimension
2.3.4	simple machines, pulleys, levers, inclined plane, wedge, screw, wheel and axles, friction, force, distance,
2.4.1	work, energy transformation, mechanical, light, sound, electrical, chemical, nuclear, conserved, fossil fuel, power plant, transfer
2.4.2	electromagnetic energy, transmitted, reflected, refracted, absorbed, white light, color, angle of reflection/incidence
2.4.3	heat energy, transfer, radiation, convection, conduction, initial

Grade 5-7 Assessed Indicator Vocabulary

Standard 3 Life	
3.1.1	organism, cells, multi-cellular, single-cell, cell theory, preexisting cell, structures/functions, life functions: gas exchange, locomotion, intake of nutrients, disposal of waste, stimulus, response, reproduction
3.1.2	levels of organization: cells, tissues, organ, organ systems, organisms; heredity, digestive system, circulatory system, compare/contrast plant and animal cells: cell wall, cell membrane, chloroplast, nucleus, cytoplasm; respiratory, integumentary, immune, skeletal, nervous, body cells, cellular reproduction: growth and repair; reproduce
3.2.1	asexual/sexual reproduction, regeneration, plant cuttings, trait, sex cells, asexual propagation of plants, fertilization, ovum, life cycle, pollination, sexual reproduction in plants, survival of species
3.3.1	environmental conditions: light, moisture, gravity, temperature; behavior, response, maintain, regulate, stable internal conditions, survive, environment, pill bug, stimuli/stimulus, phototropism, geotropism, thermotropism, innate responses, responses to seasonal changes: nocturnal, migration, hibernation, color change, fur length; imbalance
3.4.1	biotic, abiotic, population, ecosystem, food web diagram, parasite infestation, species, interactions, affects of drought on an ecosystem, community
3.4.3	producers, consumers, decomposers, photosynthesis, energy: chemical/radiant, organism, classify, energy transfer, roll in a food web, fungi, bacteria, organic matter
3.5.2	successive generations, biological diversity, accumulate, adaptations
3.5.3	extinction, species, natural selection, adaptation, generations
Standard 4 Earth/Space	
4.1.1	atmosphere, properties, systems, geosphere (crust, mantle, inner core, outer core), hydrosphere, biosphere, sediment load, climate, erosion force, ozone layer, relative position, altitude
4.1.2	model, constructive/destructive processes, earth's cycles, water cycle: evaporation, condensation, precipitation, runoff, infiltration, transpiration; volcanic eruption, hurricane, humidity, polar, tropical, continental, marine, weathering, erosion, deposition, ocean and wind currents, sedimentations, compaction, igneous, sedimentary, metamorphic, elevation, soil, solar energy, transpiration, land forms, pressure (related to weather), wind patterns
4.2.1	crust, mantle, lithospheric plates, catastrophe, comet, asteroids, convection currents, land forms, continental drift, tectonic plates, diverging, subduction, converging, plate boundaries, rift valleys, ocean trenches, coastal mountains, geothermal activity, Ring of Fire
4.3.1	stars, planets, moons, comets, asteroids, spherically shaped, solar system, relative sizes and distances, apparent brightness
4.4.1	rotation, revolution, tilt, axis, orbit, gravitational pull, tides, moon phases, illuminated, angles, one rotation of the earth, 1 revolution of the earth, one revolution of the moon, correct order of moon phases, relationships, gravitational forces and tides, solar and lunar eclipses, hemisphere, seasons

Grade 5-7 Assessed Indicator Vocabulary

Standard 6 Science in Personal and Environmental Perspectives	
6.1.1	hygiene, nutrition, exercise, benefits, risks, nutritional, toxic, natural and synthetic foods, vitamins, mineral, vegetarian, pollutants, household chemicals, ultraviolet solar radiation, illegal, susceptible, nicotine, addictive drugs, coordination, muscle tone, stamina, cardiovascular, aerobic exercise
6.2.1	stream channelization, runoff, fossil fuels, short term, long term, global warming, acid rain, urban sprawl, overpopulation, traffic volume, water quality, air quality, pollution, greenhouse effects, greenhouse gases, thinning ozone layer, causes and effects of pollution, pesticides, emissions, thermal pollution, reforestation, habitat restoration, recycling, non-polluting energy sources, farming techniques, water table, species extinction, renewable and nonrenewable resources, energy conservation
Standard 7 History and Nature of Science	
7.2.1	sequence of events, germ theory, evolution, Newton, Galileo, Darwin, Mendel, Wegener, Pasteur, Einstein, Curies, ethnicity, natural selection, radioactivity, astronomy, plate theory