INDIANA DEPARTMENT of EDUCATION

2024 INDIANA CONTENT CONNECTORS

SCIENCE

GRADE 6

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Indiana Content Connectors Context and Purpose

Introduction

The Indiana Content Connectors for Grade 6 Science are the result of a process designed to identify, evaluate, synthesize, and create high-quality learning expectations for Indiana students with significant cognitive disabilities.

The Indiana Department of Education (IDOE) convened stakeholder committees to review proposed revisions to Indiana's Alternative Standards, known as content connectors. The content connectors are designed to measure the knowledge and skills of students with the most significant cognitive disabilities and are assessed with the state's alternate assessment. The content connectors are designed to ensure that all Indiana students in this population are prepared with essential knowledge and skills needed to access employment, enrollment, or enlistment leading to service.

What are the Content Connectors and how should they be used?

The Indiana Content Connectors are designed to help educators, parents, students, and community members understand the necessary content for each grade level, and within each content area domain, to access employment, enrollment, or enlistment leading to service. These content connectors should form the basis for strong core instruction for all students at each grade level and content area. The content connectors identify the minimum academic content or skills to which Indiana students need access in order to be prepared for success after graduation, but they are not an exhaustive list.

While the Indiana Content Connectors establish key expectations for knowledge and skills and should be used as the basis for curriculum, the content connectors by themselves do not constitute a curriculum. It is the responsibility of the local school corporation to select and formally adopt curricular tools, including textbooks and any other supplementary materials, that align with Indiana Content Connectors. Additionally, corporation and school leaders should consider the appropriate instructional sequence of the content connectors as well as the length of time needed to teach each one. Every content connector has a unique place in the continuum of learning, but each content connector will not require the same amount of time and attention. A deep understanding of the vertical articulation of the standards will enable educators to make the best instructional decisions. These content connectors must also be complemented by robust, evidence-based instructional practices to support overall student development. By utilizing strategic and intentional instructional practices, other areas such as STEM and employability skills can be integrated with the content connectors.

Acknowledgments

IDOE appreciates the time, dedication, and expertise offered by Indiana's K-12 general and special educators, higher education professors, representatives from business and industry, families, and other stakeholders who contributed to the development of the Indiana Content Connectors. We wish to specially acknowledge the committee members, as well as participants in the public comment period, who dedicated many hours to the review and evaluation of these content connectors designed to prepare Indiana students for success after graduation.

Grade 6 Science

Standards and content connectors identified as essential for mastery by the end of the grade level are indicated with gray shading and an "E."

Indiana Academic Standards	Content Connectors
Waves and Their Applications in Technologies for Information Transfer	
MS-PS4-1: Waves and Their Applications in Technologies for Information Transfer Students who demonstrate understanding can: Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.]	**MS-PS4-1a:** Use mathematical representations to describe how the amplitude of a wave is related to the energy in a wave.
MS-PS4-2: Waves and Their Applications in Technologies for Information Transfer Students who demonstrate understanding can: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] (E)	**MS-PS4-2a:** Use a model to identify how waves are reflected, absorbed, or transmitted through various materials (e.g., water, air, glass). (E)
MS-PS4-3: Waves and Their Applications in Technologies for Information Transfer Students who demonstrate understanding can: Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in Wi-Fi devices, and	**MS-PS4-3a:** Summarize information or evidence that supports the claim that digital transmission of signals is more reliable than analog transmission of signals.

conversion of stored binary patterns to make sound or text on a computer screen.]	
From Molecules to Organisms: Structures and Processes	
MS-LS1-6: From Molecules to Organisms: Structures and Processes Students who demonstrate understanding can: Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] (E)	**MS-LS1-6a:** Create a model to show the movement of matter and flow of energy as plants use the energy from light to make sugars. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] (E)
Ecosystems: Interactions, Energy, and Dynamics	
MS-LS2-1: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause-and-effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]	**MS-LS2-1a:** Use data to identify a cause-and-effect relationship between resource availability and the growth of individual organisms and population size.
MS-LS2-2: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial (symbiosis).]	**MS-LS2-2a:** Predict patterns of interactions (e.g., competitive, predatory, symbiotic) among organisms within an ecosystem and across ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial (symbiosis).]

MS-LS2-3: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.]	**MS-LS2-3a:** Use a model to describe the cycling of matter and flow of energy among producers, consumers, and decomposers in an ecosystem. (E)
MS-LS2-4: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.] (E)	**MS-LS2-4a:** Use data to find patterns in how changes to physical or biological parts of an ecosystem affect populations of organisms. (E)
MS-LS2-5: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can: Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]	**MS-LS2-5a:** Compare two or more design solutions for maintaining a healthy, stable, functioning ecosystem with a variety of species (biodiversity). [Clarification Statement: Examples of solutions could include water purification, nutrient recycling, and prevention of soil erosion].
Earth's Place in the Universe	
MS-ESS1-1: Earth's Place in the Universe Students who demonstrate understanding can: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. [Clarification Statement: Examples of models can be physical, graphical, or conceptual.] (E)	**MS-ESS1-1a:** Use patterns observed from an Earth-sun-moon model to describe interactions causing events such as moon phases, eclipses, or seasons. (E)

MS-ESS1-2: Earth's Place in the Universe Students who demonstrate understanding can: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. [Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical (such as the analogy of distance along a football field or computer visualizations of elliptical orbits) or conceptual (such as mathematical proportions relative to the size of familiar objects such as students' school or state.]	**MS-ESS1-2a:** Use a model to describe the role of gravity in the motions within the Milky Way galaxy and the solar system.
MS-ESS1-3: Earth's Place in the Universe Students who demonstrate understanding can: Analyze and interpret data to determine scale properties of objects in the solar system. [Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data include statistical information, drawings and photographs, and models].	**MS-ESS1-3a:** Determine similarities and differences among scale properties of objects in the solar system (e.g., the sizes of an object's layers such as crust and atmosphere, surface features, and orbital radius) using data (e.g., information, drawings, photographs, or models).
Engineering Design	
MS-ETS1-1: Engineering Design Students who demonstrate understanding can: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	**MS-ETS1-1a:** Define criteria and constraints (e.g., scientific principles, potential impacts on people, the natural environment) of a problem to ensure a successful solution.

MS-ETS1-2: Engineering Design Students who demonstrate understanding can: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	**MS-ETS1-2a:** Select the best solution to a problem using evidence of alignment to criteria and constraints.
MS-ETS1-3: Engineering Design Students who demonstrate understanding can: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	**MS-ETS1-3a:** Combine the best characteristics from multiple solutions into a new solution to better meet the criteria for success.
MS-ETS1-4: Engineering Design Students who demonstrate understanding can: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	**MS-ETS1-4a:** Use a model to generate data on how a design proposal can be modified for improvements through iterative testing.