Science, Technology, English, and Math National Standards

Science, Technology, English, and Mathematics
National Standards Used for 2009 SECME Summer Institute Modules

National Science Standards

National Science Standards Grades K-4

NS.K-4.1 SCIENCE AS INQUIRY

As a result of activities in grades K-4, all students should develop

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

NS.K-4.2 PHYSICAL SCIENCE

As a result of the activities in grades K-4, all students should develop an understanding of

- Properties of objects and materials
- Position and motion of objects
- Light, heat, electricity, and magnetism

NS.K-4.3 LIFE SCIENCE

As a result of activities in grades K-4, all students should develop understanding of

- The characteristics of organisms
- Life cycles of organisms
- Organisms and environments

NS.K-4.4 EARTH AND SPACE SCIENCE

As a result of their activities in grades K-4, all students should develop an understanding of

- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

NS.K-4.5 SCIENCE AND TECHNOLOGY

As a result of activities in grades K-4, all students should develop

- Abilities of technological design
- Understanding about science and technology
- Abilities to distinguish between natural objects and objects made by humans

NS.K-4.6 PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop understanding of

- Personal health
- Characteristics and changes in populations
- Types of resources
- Changes in environments
- Science and technology in local challenges

NS.K-4.7 HISTORY OF NATURE AND SCIENCE

As a result of activities in grades K-4, all students should develop understanding of

- Science as a human endeavor

National Science Standards Grades 5-8

NS.5-8.1 SCIENCE AS INQUIRY

As a result of activities in grades 5-8, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

NS.5-8.2 PHYSICAL SCIENCE

As a result of their activities in grades 5-8, all students should develop an understanding

- Properties and changes of properties in matter
- Motions and forces
- Transfer of energy

NS.5-8.3 LIFE SCIENCE

As a result of their activities in grades 5-8, all students should develop understanding

- Structure and function in living systems
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

NS.5-8.4 EARTH AND SPACE SCIENCE

As a result of their activities in grades 5-8, all students should develop an understanding

- Structure of the earth system
- Earth's history
- Earth in the solar system

NS.5-8.5 SCIENCE AND TECHNOLOGY

As a result of activities in grades 5-8, all students should develop

- Abilities of technological design
- Understandings about science and technology

NS.5-8.6 PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 5-8, all students should develop understanding

- Personal health
- Populations, resources, and environments
- Natural hazards
- Risks and benefits
- Science and technology in society

NS.5-8.7 HISTORY AND NATURE OF SCIENCE

As a result of activities in grades 5-8, all students should develop understanding of

- Science as a human endeavor
- Nature of science
- History of science

Science Standards Grades 9-12

NS.9-12.1 SCIENCE AS INQUIRY

As a result of activities in grades 9-12, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

NS.9-12.2 PHYSICAL SCIENCE

As a result of their activities in grades 9-12, all students should develop an understanding of

- Structure of atoms
- Structure and properties of matter
- Chemical reactions
- Motions and forces
- Conservation of energy and increase in disorder
- Interactions of energy and matter

NS.9-12.3 LIFE SCIENCE

As a result of their activities in grades 9-12, all students should develop understanding of

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

NS.9-12.4 EARTH AND SPACE SCIENCE

As a result of their activities in grades 9-12, all students should develop an understanding of

- Energy in the earth system
- Geochemical cycles
- Origin and evolution of the earth system
- Origin and evolution of the universe

NS.9-12.5 SCIENCE AND TECHNOLOGY

As a result of activities in grades 9-12, all students should develop

- Abilities of technological design
- Understandings about science and technology

NS.9-12.6 PESONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades 9-12, all students should develop understanding of

- Personal and community health
- Population growth
- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

NS.9-12.7 HISTORY AND NATURE OF SCIENCE

As a result of activities in grades 9-12, all students should develop understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

National Technology Standards K-12

NT.K-12.1 BASIC OPERATIONS AND CONCEPTS

- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students are proficient in the use of technology.

NT.K-12.2 SOCIAL, ETHICAL, AND HUMAN ISSUES

- Students understand the ethical, cultural, and societal issues related to technology.
- Students practice responsible use of technology systems, information, and software.
- Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

NT.K-12.3 TECHNOLOGY PRODUCTIVITY TOOLS

- Students use technology tools to enhance learning, increase productivity, and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS

- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

NT.K-12.5 TECHNOLOGY RESEARCH TOOLS

- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

NT.K-12.6 TECHNOLOGY PROBLEM-SOLVING AND DECISION-MAKING TOOLS

- Students use technology resources for solving problems and making informed decisions.
- Students employ technology in the development of strategies for solving problems in the real world.

National Language Arts Standards K-12

NL-ENG.K-12.1 READING FOR PERSPECTIVE
Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.

NL-ENG.K-12.2 UNDERSTANDING THE HUMAN EXPEREINCE
Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience.

NL-ENG.K-12.3 EVALUATION STRATEGIES
Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

NL-ENG.K-12.4 COMMUNICATION SKILLS
Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

NL-ENG.K-12.5 COMMUNICATION STRATEGIES
Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

NL-ENG.K-12.6 APPLYING KNOWLEDGE
Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts.

NL-ENG.K-12.7 EVALUATING DATA
Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

NL-ENG.K-12 .8 DEVELOPING RESEARCH SKILLS
Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

NL-ENG.K-12.9 MULTICULTURAL UNDERSTANDING
Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.

NL-ENG.K-12.10 APPLYING NON-ENGLISH PERSPECTIVES
Students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum.

NL-ENG.K-12.11 PARTICPATING IN SOCIETY
Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.

NL-ENG.K-12.12 APPLYING LANGUAGE SKILLS
Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

National Mathematics Standards K-12

NUMBERS AND OPERATIONS

Instructional programs from prekindergarten through grade 12 should enable all students to

- understand numbers, ways of representing numbers, relationships among numbers, and number systems;
- understand meanings of operations and how they relate to one another;
- compute fluently and make reasonable estimates.

ALGEBRA

Instructional programs from prekindergarten through grade 12 should enable all students to

- understand patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships;
- analyze change in various contexts.

GEOMETRY

Instructional programs from prekindergarten through grade 12 should enable all students to

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations;
- use visualization, spatial reasoning, and geometric modeling to solve problems.

MEASUREMENT

Instructional programs from prekindergarten through grade 12 should enable all students to

- understand measurable attributes of objects and the units, systems, and processes of measurement;
- apply appropriate techniques, tools, and formulas to determine measurements.

DATA ANALYSIS AND PROBABILITY

Instructional programs from prekindergarten through grade 12 should enable all students to

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on data;
- understand and apply basic concepts of probability.

PROBLEM SOLVING

Instructional programs from prekindergarten through grade 12 should enable all students to

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems;
- monitor and reflect on the process of mathematical problem solving.

REASONING AND PROOF

Instructional programs from prekindergarten through grade 12 should enable all students to

- recognize reasoning and proof as fundamental aspects of mathematics;
- make and investigate mathematical conjectures;
- develop and evaluate mathematical arguments and proofs;
- select and use various types of reasoning and methods of proof.

COMMUNICATION

Instructional programs from prekindergarten through grade 12 should enable all students to

- organize and consolidate their mathematical thinking through communication;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- analyze and evaluate the mathematical thinking and strategies of others;
- use the language of mathematics to express mathematical ideas precisely.

CONNECTIONS

Instructional programs from prekindergarten through grade 12 should enable all students to

- recognize and use connections among mathematical ideas;
- understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- recognize and apply mathematics in contexts outside of mathematics.

REPRESENTATION

Instructional programs from prekindergarten through grade 12 should enable all students to

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems;
- use representations to model and interpret physical, social, and mathematical phenomena.