DOING SCIENCE: THE PROCESS OF SCIENTIFIC INQUIRY

Ohio Academic Standards for Science - Grades 6, 7, 8

Grade 6

Lesson	Standard	Description
4	Sci & Tech 1	Explain how technology influences the quality of life.
All lessons	Inquiry 1	Explain that there are not fixed procedures for guiding scientific investigations; however, the nature of an investigation determines the procedures needed.
1, 3	Inquiry 2	Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations.
All lessons	Inquiry 3	Distinguish between observation and inference.
All lessons	Ways of Knowing 1	Identify that hypotheses are valuable even when they are not supported.
1, 3, 4	Ways of Knowing 2	Describe why it is important to keep clear, thorough and accurate records.
All lessons	Ways of Knowing 3	Identify ways scientific thinking is helpful in a variety of everyday settings.

Grade 7

Lesson	Standard	Description
2, 3, 4	Sci & Tech 3	Recognize that science can only answer some questions and technology can only solve some human problems.
All lessons	Inquiry 1	Explain that variables and controls can affect the results of an investigation and that ideally one variable should be tested at a time; however it is not always possible to control all variables.
All lessons	Inquiry 2	Identify simple independent and dependent variables.
All lessons	Inquiry 3	Formulate and identify questions to guide scientific investigations that connect to science concepts and can be answered through scientific investigations.
1, 3	Inquiry 4	Choose the appropriate tools and instruments and use relevant safety procedures to complete scientific investigations.
All lessons	Inquiry 5	Analyze alternative scientific explanations and predictions and recognize that there may be more than one good way to interpret a given set of data.
All lessons	Inquiry 6	Identify faulty reasoning and statements that go beyond the evidence or misinterpret the evidence.
3, 4	Inquiry 7	Use graphs, tables and charts to study physical phenomena and infer mathematical relationships between variables (e.g., speed and density).

All lessons	**Ways of Knowing 3**	Describe how the work of science requires a variety of human abilities and qualities that are helpful in daily life (e.g., reasoning, creativity, skepticism and openness).

Grade 8

Lesson	Standard	Description
1, 3	**Inquiry 1**	Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations.
3, 4	**Inquiry 2**	Describe the concepts of sample size and control and explain how these affect scientific investigations.
3, 4	**Inquiry 3**	Read, construct and interpret data in various forms produced by self and others in both written and oral form (e.g., tables, charts, maps, graphs, diagrams and symbols).
3, 4	**Inquiry 4**	Apply appropriate math skills to interpret quantitative data (e.g., mean, median and mode).
All lessons	**Ways of Knowing 1**	Identify the difference between description (e.g., observation and summary) and explanation (e.g., inference, prediction, significance and importance).
All lessons	**Ways of Knowing 2**	Explain why it is important to examine data objectively and not let bias affect observations.

Ohio Academic Standards for English Language Arts – Grades 6, 7, 8

Lesson	Standard	Description
1, 3, 4	**Vocabulary 1**	Define the meaning of unknown words by using context clues and the author's use of: definition, restatement and example (6 & 7); comparison, contrast and cause and effect (8).
All lessons	**Reading Process 1**	Establish and adjust purposes for reading, including to find out, to understand, to interpret, to enjoy and to solve problems. (6 & 7) Apply reading comprehension strategies, including making predictions, comparing and contrasting, recalling and summarizing and making inferences and drawing conclusions (8).
All lessons	**Reading Process 2**	Answer literal, inferential, evaluative and synthesizing questions to demonstrate comprehension of grade-appropriate print texts and electronic and visual media (8).
All lessons	**Reading Process 4**	Summarize the information in texts, recognizing important ideas and supporting details, and noting (6) or referencing (7) gaps or contradictions.
All lessons	**Reading Process 6**	Answer literal, inferential, evaluative and synthesizing questions to demonstrate comprehension of grade-appropriate print texts and electronic and visual media (6 & 7).
All lessons	**Reading Applications 2**	Analyze examples of cause and effect and fact and opinion (6 & 7).
3, 4	**Reading Applications 5**	Analyze information found in maps, charts, tables, graphs, diagrams, cutaways (6) and overlays (7 & 8).
All lessons	**Reading**	Summarize information from informational text, identifying the treatment, scope and organization of ideas (6).

	Applications 8	
All lessons	**Writing Process 4**	Determine a purpose and audience (6 & 7) and plan strategies (e.g., adapting focus, content structure and point of view) to address purpose and audience (8).
All lessons	**Writing Process 7**	Vary simple, compound and complex sentence structures.
All lessons	**Writing Process 9**	Vary language and style as appropriate to audience and purpose (6).
3, 4	**Writing Process 17**	Prepare for publication (e.g., for display or for sharing with others) writing that follows a format appropriate to the purpose, using such techniques as electronic resources, principles of design (e.g., margins, tabs, spacing and columns) and graphics (e.g., drawings, charts and graphs) to enhance the final product.
3, 4	**Writing Applications 4**	Write informational essays or reports, including research.
All lessons	**Writing Applications 6**	Produce informal writings (e.g., journals, notes and poems) for various purposes.
All lessons	**Writing Conventions 1**	Spell frequently misspelled (6) and high frequency words correctly (7). Use correct spelling conventions (8).
2, 3, 4	**Research 1**	Generate a topic, assigned or personal interest, and open-ended questions for research and develop a plan for gathering information (6 & 7). Compose open-ended questions for research, assigned or personal interest, and modify questions as necessary during inquiry and investigation (8).
3, 4	**Research 2**	Identify appropriate sources, and gather relevant information from multiple sources (e.g., school library catalogs, online databases, electronic resources and Internet-based resources).
3, 4	**Research 8**	Use a variety of communication techniques, including oral, visual, written or multimedia reports, to present information that supports a clear position with organized and relevant evidence about the topic or research question.
All lessons	**Communication 1**	Demonstrate active listening strategies (e.g., asking focused questions, responding to cues, making visual contact) (6 & 7). Apply active listening strategies (e.g., monitoring message for clarity, selecting and organizing essential information, noting cues such as changes in pace) (8).
3, 4	**Communication 2**	Summarize the main idea and draw conclusions from presentations and visual media. (6) Draw logical inferences from presentations and visual media. (7)
3, 4	**Communication 3**	Interpret the speaker's purpose in presentations and visual media (e.g., to inform, to entertain, to persuade) (6 & 7).
1, 3, 4	**Communication 8**	Deliver informational presentations (e.g., expository, research) that: demonstrate an understanding of the topic and present events or ideas in a logical sequence; support the controlling idea or thesis with relevant facts, details, examples, quotations, statistics, stories and anecdotes; include an effective introduction and conclusion and use a consistent organizational structure (e.g., cause-effect, compare-contrast); use appropriate visual materials (e.g., diagrams, charts, illustrations) and available technology; and draw from multiple sources and identify sources used.

Ohio Academic Standards for Mathematics – Grades 6, 7, 8		
Grade 6		
Lesson	**Standard**	**Description**
3	**Number, Number Sense and Operations 5**	Use models and pictures to relate concepts of ratio, proportion and percent, including percents less than 1 and greater than 100.
3	**Number, Number Sense and Operations 14**	Use proportional reasoning, ratios and percents to represent problem situations and determine the reasonableness of solutions.
3, 4	**Patterns, Functions and Algebra 1**	Represent and analyze patterns, rules and functions, using physical materials, tables and graphs.
3	**Patterns, Functions and Algebra 5**	Produce and interpret graphs that represent the relationship between two variables.
3	**Data Analysis and Probability 1**	Read, construct and interpret line graphs, circle graphs and histograms.
3, 4	**Data Analysis and Probability 2**	Select, create and use graphical representations that are appropriate for the type of data collected.
3, 4	**Data Analysis and Probability 6**	Make logical inferences from statistical data.
Grade 7		
Lesson	**Standard**	**Description**
3	**Number, Number Sense, and Operations 7**	Solve problems using the appropriate form of a rational number (fraction, decimal or percent).

3	**Patterns, Functions and Algebra 1**	Represent and analyze patterns, rules and functions with words, tables, graphs and simple variable expressions.
3	**Patterns, Functions and Algebra 10**	Analyze linear and simple nonlinear relationships to explain how a change in one variable results in the change of another.
3	**Data Analysis and Probability 1**	Read, create and interpret box-and-whisker plots, stem-and-leaf plots, and other types of graphs, when appropriate.
3	**Data Analysis and Probability 2**	Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.
3, 4	**Data Analysis and Probability 5**	Compare data from two or more samples to determine how sample selection can influence results.
Grade 8		
Lesson	**Standard**	**Description**
3	**Number, Number Sense, and Operations 6**	Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions.
1	**Measurement 3**	Use appropriate levels of precision when calculating with measurements.
3	**Data Analysis and Probability 1**	Use, create and interpret scatterplots and other types of graphs as appropriate.
3, 4	**Data Analysis and Probability 7**	Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample.
3, 4	**Data Analysis and Probability 9**	Construct convincing arguments based on analysis of data and interpretation of graphs.
National Health Education Standards – Grades 6 – 8: cited from pre-publication document of National Health Education Standards, Pre K-12, American Cancer Society, December 2005 – August 2006		
Lesson	**Standard**	**Performance Indicator**

3, 4	**1.8.1**	Analyze the relationship between healthy behaviors and personal health.
3	**1.8.3**	Analyze how the environment impacts personal health.
4	**1.8.5**	Describe ways to reduce or prevent injuries and other adolescent health problems.
3, 4	**1.8.7**	Describe the benefits and barriers to practicing healthy behaviors.
3, 4	**1.8.8**	Examine the likelihood of injury or illness if engaging in unhealthy behaviors.
3, 4	**1.8.9**	Examine the potential seriousness of injury or illness if engaging in unhealthy behaviors.
3	**2.8.3**	Describe how peers influence healthy and unhealthy behaviors.
3	**2.8.8**	Explain the influence of personal values and beliefs on individual health practices and behaviors.
3, 4	**2.8.9**	Describe how some health risk behaviors can influence the likelihood of engaging in unhealthy behaviors.
3, 4	**2.8.10**	Explain how school and public health policies can influence health promotion and disease prevention.
3, 4	**3.8.1**	Analyze the validity of health information, products, and services.
3, 4	**3.8.4**	Describe situations that may require professional health services.
3, 4	**4.8.1**	Apply effective verbal and nonverbal communication skills to enhance health.
3	**5.8.1**	Identify circumstances that can help or hinder healthy decision-making.
3, 4	**5.8.2**	Determine when health-related situations require the application of a thoughtful decision-making process.
3, 4	**5.8.3**	Distinguish when individual or collaborative decision-making is appropriate.
3, 4	**5.8.5**	Predict the potential short and long-term impact of each alternative on self and others.
4	**5.8.6**	Choose healthy alternatives over unhealthy alternatives when making a decision.
3, 4	**5.8.7**	Analyze the outcomes of a health-related decision.
3, 4	**7.8.3**	Demonstrate behaviors to avoid or reduce health risks to self and others.
3, 4	**8.8.1**	State a health enhancing position on a topic and support it with accurate information.
4	**8.8.2**	Demonstrate how to influence and support others to make positive health choices.
4	**8.8.4**	Identify ways that health messages and communication techniques can be altered for different audiences.