

**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.**

<b>EARLY ELEMENTARY</b>	<b>LATE ELEMENTARY</b>	<b>MIDDLE/JUNIOR HIGH SCHOOL</b>	<b>EARLY HIGH SCHOOL</b>	<b>LATE HIGH SCHOOL</b>
<b>13.A.1a</b> Use basic safety practices (e.g., not tasting materials without permission, “stop/drop/roll”).	<b>13.A.2a</b> Demonstrate ways to avoid injury when conducting science activities (e.g., wearing goggles, fire extinguisher use).	<b>13.A.3a</b> Identify and reduce potential hazards in science activities (e.g., ventilation, handling chemicals).	<b>13.A.4a</b> Estimate and suggest ways to reduce the degree of risk involved in science activities.	<b>13.A.5a</b> Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.
<b>13.A.1b</b> Explain why similar results are expected when procedures are done the same way.	<b>13.A.2b</b> Explain why similar investigations may not produce similar results.	<b>13.A.3b</b> Analyze historical and contemporary cases in which the work of science has been affected by both valid and biased scientific practices.	<b>13.A.4b</b> Assess the validity of scientific data by analyzing the results, sample set, sample size, similar previous experimentation, possible misrepresentation of data presented and potential sources of error.	<b>13.A.5b</b> Explain criteria that scientists use to evaluate the validity of scientific claims and theories.
<b>13.A.1c</b> Explain how knowledge can be gained by careful observation.	<b>13.A.2c</b> Explain why keeping accurate and detailed records is important.	<b>13.A.3c</b> Explain what is similar and different about observational and experimental investigations.	<b>13.A.4c</b> Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).	<b>13.A.5c</b> Explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling and statistical studies.
			<b>13.A.4d</b> Explain how peer review helps to assure the accurate use of data and improves the scientific process.	<b>13.A.5d</b> Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are essential to scientific claims.

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

<b>EARLY ELEMENTARY</b>	<b>LATE ELEMENTARY</b>	<b>MIDDLE/JUNIOR HIGH SCHOOL</b>	<b>EARLY HIGH SCHOOL</b>	<b>LATE HIGH SCHOOL</b>
<b>13.B.1a</b> Explain the uses of common scientific instruments (e.g., ruler, thermometer, balance, probe, computer).	<b>13.B.2a</b> 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).	<b>13.B.3a</b> Identify and explain ways that scientific knowledge and economics drive technological development.	<b>13.B.4a</b> Compare and contrast scientific inquiry and technological design as pure and applied sciences.	<b>13.B.5a</b> Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).
<b>13.B.1b</b> Explain how using measuring tools improves the accuracy of estimates.	<b>13.B.2b</b> Describe the effects on society of scientific and technological innovations (e.g., antibiotics, steam engine, digital computer).	<b>13.B.3b</b> Identify important contributions to science and technology that have been made by individuals and groups from various cultures.	<b>13.B.4b</b> Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science.	<b>13.B.5b</b> Analyze and describe the processes and effects of scientific and technological breakthroughs.
<b>13.B.1c</b> Describe contributions men and women have made to science and technology.	<b>13.B.2c</b> Identify and explain ways that science and technology influence the lives and careers of people.	<b>13.B.3c</b> Describe how occupations use scientific and technological knowledge and skills.	<b>13.B.4c</b> Analyze ways that resource management and technology can be used to accommodate population trends.	<b>13.B.5c</b> Design and conduct an environmental impact study, analyze findings and justify recommendations.
<b>13.B.1d</b> Identify and describe ways that science and technology affect people's everyday lives (e.g., transportation, medicine, agriculture, sanitation, communication occupations).	<b>13.B.2d</b> Compare the relative effectiveness of reducing, reusing and recycling in actual situations.	<b>13.B.3d</b> Analyze the interaction of resource acquisition, technological development and ecosystem impact (e.g., diamond, coal or gold mining; deforestation).	<b>13.B.4d</b> Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	<b>13.B.5d</b> Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).
<b>13.B.1e</b> Demonstrate ways to reduce, reuse and recycle materials.	<b>13.B.2e</b> Identify and explain ways that technology changes ecosystems (e.g., dams, highways, buildings, communication networks, power plants).	<b>13.B.3e</b> Identify advantages and disadvantages of natural resource conservation and management programs.	<b>13.B.4e</b> Evaluate claims derived from purported scientific studies used in advertising and marketing strategies.	<b>13.B.5e</b> Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life.
	<b>13.B.2f</b> Analyze how specific personal and societal choices that humans make affect local, regional and global ecosystems (e.g., lawn and garden care, mass transit).	<b>13.B.3f</b> Apply classroom-developed criteria to determine the effects of policies on local science and technology issues (e.g., energy consumption, landfills, water quality).		