



**ARIZONA**  
**Science Standard Articulated By Grade Level Grade 8**  
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STANDARDS	PAGE REFERENCES
<b>Strand 1: Inquiry Process</b>	
Inquiry Process establishes the basis for students' learning in science. Students use scientific processes: questioning, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, and communicating results.	
<b>Concept 1: Observations, Questions, and Hypotheses</b>	
Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.	
<i>PO 1. Formulate questions based on observations that lead to the development of a hypothesis.</i> (See M08-S2C1-01)	SE: 8 <i>Applying Science</i> 228, 269 <i>Lab</i> 58-59, 778-779 <i>Science and Society</i> 346, 718 <i>Science Skill Handbook</i> 791-792  TWE: A 9 IL 12
PO 2. Use appropriate research information, not limited to a single source, to use in the development of a testable hypothesis. (See R08-S3C2-03 and W-E8-01)	SE: 8 <i>Accidents in Science</i> 624, 654 <i>Lab</i> 116-117, 148-149, 344-345, 652-653, 680 <i>Science Skill Handbook</i> 791  TWE: IL 12
PO 3. Generate a hypothesis that can be tested.	SE: 8 <i>Applying Science</i> 269 <i>Lab</i> 214-215, 406-407, 466-467, 778-779 <i>Science and History</i> 92 <i>Science Skill Handbook</i> 791-792  TWE: A 9 IL 12
<b>Concept 2: Scientific Testing (Investigating and Modeling)</b>	
Design and conduct controlled investigations.	
<i>PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.</i>	SE: <i>Applying Science</i> 269 <i>Lab</i> 246-247, 344-345, 466-467, 622-623, 652-653, 735, 748-749 <i>Science and Society</i> 346 <i>Science Skill Handbook</i> 797-799
PO 2. Design a controlled investigation to support or reject a hypothesis.	SE: 8-9 <i>Lab</i> 116-117, 246-247, 344-345, 406-407, 466-467, 622-623, 716-717, 778-779 <i>Science Skill Handbook</i> 791
PO 3. Conduct a controlled investigation to support or reject a hypothesis.	SE: <i>Lab</i> 116-117, 246-247, 344-345, 406-407, 466-467, 622-623, 716-717, 778-779 <i>Science Skill Handbook</i> 792  TWE: FF 8

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PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).	SE: 14-21 Lab 27, 28-29, 57, 90-91, 148-149, 680, 778-779 Launch Lab 5 Science Skill Handbook 792-795
PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.	SE: 8 Lab 27, 106, 148-149, 206, 277, 484 Mini LAB 19, 42 Science Skill Handbook 792-793
<b>Concept 3: Analysis and Conclusions</b> Analyze and interpret data to explain correlations and results; formulate new questions.	
PO 1. Analyze data obtained in a scientific investigation to identify trends. (See M08-S2C1-08)	SE: 10, 22-26, 38-43 Lab 58-59, 180-181, 206, 246-247, 278-279, 680, 778-779 Mini LAB 169
PO 2. Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).	SE: 52-56, 261, 354-356 Lab 57, 58-59 Science and Society 346, 718 Science Skill Handbook 789-790, 796 TWE: AS 295
PO 3. Interpret data that show a variety of possible relationships between two variables, including: <ul style="list-style-type: none"> <li>• positive relationship</li> <li>• negative relationship</li> <li>• no relationship</li> </ul>	SE: 22-26, 262-263, 492, 494 Lab 148-149, 338, 406-407, 778-779 Math Skill Handbook 830-831 Science Skill Handbook 795-796
PO 4. Formulate a future investigation based on the data collected.	SE: 8-10 Communicating Your Data 749 Lab 116-117 Science Skill Handbook 796 TWE: AIL 214, 246, 716, 778 CYD 527 IL 12
PO 5. Explain how evidence supports the validity and reliability of a conclusion.	SE: 10 Lab 89, 148-149, 206, 366, 680, 778-779 Science and Society 346, 718 Science Skill Handbook 796
PO 6. Identify the potential investigational error that may occur (e.g., flawed investigational design, inaccurate measurement, computational errors, unethical reporting).	SE: 10 Science Skill Handbook 796 TWE: EA 215, 313, 467, 497, 623, 717 FF 10 QD 17
PO 7. Critique scientific reports from periodicals, television, or other media.	SE: 8 Science Skill Handbook 788 TWE: AIL 344 CB 376 CUR 10 IL 12 RES 780

STANDARDS	PAGE REFERENCES
PO 8. Formulate new questions based on the results of a previous investigation.	SE: 8-10 <i>Lab</i> 116-117, 206, 214-215, 245, 466-467, 496-497, 680, 748-749 <i>Science Skill Handbook</i> 796
<b>Concept 4: Communication</b> Communicate results of investigations.	
PO 1. Communicate the results of an investigation.	SE: 10, 22-26 <i>Communicating Your Data</i> 29, 59, 181, 527 <i>Lab</i> 90-91, 496-497, 778-779 <i>Science Skill Handbook</i> 796
PO 2. Choose an appropriate graphic representation for collected data: <ul style="list-style-type: none"> <li>• line graph</li> <li>• double bar graph</li> <li>• stem and leaf plot</li> <li>• histogram</li> </ul> (See M08-S2C1-03)	SE: 22-26, 42-43 <i>Lab</i> 90-91, 180-181, 277, 484, 686-687 <i>Math Skill Handbook</i> 830-831 <i>Technology Skill Handbook</i> 815 TWE: QD 24
PO 3. Present analyses and conclusions in clear, concise formats. (See W-E6-PO1)	SE: 10 <i>Applying Science</i> 269 <i>Science Skill Handbook</i> 796 <i>Technology Skill Handbook</i> 814-816 TWE: CYD 59, 117, 215, 467, 593, 735
PO 4. Write clear, step-by-step instructions for conducting investigations or operating equipment (without the use of personal pronouns).	SE: <i>Lab</i> 58-59, 116-117, 214-215, 246-247, 344-345, 406-407, 466-467, 592-593, 622-623, 716-717
PO 5. Communicate the results and conclusion of the investigation.	SE: 10 <i>Lab</i> 58-59, 116-117, 180-181, 214-215, 466-467, 496-497, 592-593, 778-779 <i>Science Skill Handbook</i> 796
<b>Strand 2: History and Nature of Science</b> Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures.	
<b>Concept 1: History of Science as a Human Endeavor</b> Identify individual, cultural, and technological contributions to scientific knowledge.	
PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Watson and Crick [scientists], support Strand 4; Rosalind Franklin [scientist], supports Strand 4; Charles Darwin [scientist], supports Strand 4; George Washington Carver [scientist, inventor], supports Strand 4; Joseph Priestley [scientist], supports Strand 5; Sir Frances Bacon [philosopher], supports Strand 5; Isaac Newton [scientist], supports Strand 5).	SE: 231, 238 <i>Integrate History</i> 540 <i>Science and History</i> 92, 376, 560 TWE: A 45 CUL 84, 104, 428 CUR 128

STANDARDS	PAGE REFERENCES
PO 2. Evaluate the effects of the following major scientific milestones on society: <ul style="list-style-type: none"> <li>• Mendelian Genetics</li> <li>• Newton’s Laws</li> </ul>	SE: 54-55, 83-84 <i>Integrate Astronomy</i> 76 <i>National Geographic</i> 85 <i>Science and History</i> 92 TWE: FF 55 FYI 69
PO 3. Evaluate the impact of a major scientific development occurring within the past decade.	SE: <i>Accidents in Science</i> 624 <i>National Geographic</i> 430, 555, 666 <i>Science and History</i> 248, 528 <i>Science and Society</i> 150, 440
PO 4. Evaluate career opportunities related to life and physical sciences.	SE: <i>Integrate Career</i> 208, 240, 325, 370, 520, 576, 743 <i>Integrate Health</i> 84 <i>Science and History</i> 248, 314
<b>Concept 2: Nature of Scientific Knowledge</b> Understand how science is a process for generating knowledge.	
PO 1. Apply the following scientific processes to other problem solving or decision making situations: <ul style="list-style-type: none"> <li>• <i>observing</i></li> <li>• <i>questioning</i></li> <li>• <i>communicating</i></li> <li>• <i>comparing</i></li> <li>• <i>measuring</i></li> <li>• <i>classifying</i></li> <li>• <i>predicting</i></li> <li>• <i>organizing data</i></li> <li>• <i>inferring</i></li> <li>• <i>generating hypotheses</i></li> <li>• <i>identifying variables</i></li> </ul>	SE: <i>Integrate Social Studies</i> 299, 549 <i>National Geographic</i> 2-3, 188-189, 286-287, 566-567 <i>Science and Language Arts</i> 30, 60, 216, 408 TWE: DIN 24
PO 2. Describe how scientific knowledge is subject to change as new information and/or technology challenges prevailing theories.	SE: 8-10 <i>Accidents in Science</i> 654 <i>National Geographic</i> 446-447, 769 <i>Science and History</i> 92, 376, 560 TWE: A 45 CUL 8 IL 12
PO 3. Defend the principle that accurate record keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society.	SE: 6-10 <i>Lab</i> 312-313, 496-497, 686-687 <i>Science Skill Handbook</i> 788-791, 795-796 TWE: AIL 28
PO 4. Explain why scientific claims may be questionable if based on very small samples of data, biased samples, or samples for which there was no control.	SE: 9-10 <i>Science and History</i> 118 <i>Science Skill Handbook</i> 792-793, 796 TWE: AIL 28 FF 10

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<p align="center"><b>Strand 3: Science in Personal and Social Perspectives</b></p> <p>Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners.</p>	
<p><b>Concept 1: Changes in Environments</b> Describe the interactions between human populations, natural hazards, and the environment.</p>	
<p>PO 1. Analyze the risk factors associated with natural, human induced, and/or biological hazards, including:</p> <ul style="list-style-type: none"> <li>• waste disposal of industrial chemicals</li> <li>• greenhouse gases</li> </ul>	<p>SE: 267-269, 550 <i>Integrate Environment</i> 364, 581 <i>Integrate Health</i> 205, 309, 685 <i>Integrate Social Studies</i> 299 <i>Lab</i> 652-653 <i>Science and Society</i> 280, 346</p>
<p>PO 2. Analyze possible solutions to address the environmental risks associated with chemicals and biological systems.</p>	<p>SE: 267-269, 550 <i>Integrate Environment</i> 364 <i>Lab</i> 652-653 <i>Science and Society</i> 280, 718 TWE: SJ 552</p>
<p><b>Concept 2: Science and Technology in Society</b> Develop viable solutions to a need or problem.</p>	
<p><i>PO 1. Propose viable methods of responding to an identified need or problem.</i></p>	<p>SE: 271-276 <i>Applying Science</i> 228 <i>Lab</i> 148-149, 344-345, 652-653 <i>Science and Society</i> 280, 346 TWE: DIN 581</p>
<p><i>PO 2. Compare solutions to best address an identified need or problem.</i></p>	<p>SE: 271-276 <i>Lab</i> 148-149, 277, 278-279, 344-345 <i>Science and Society</i> 346 TWE: FYI 268 IM 273 RE 276</p>
<p><i>PO 3. Design and construct a solution to an identified need or problem using simple classroom materials.</i></p>	<p>SE: <i>Applying Science</i> 228, 269 <i>Lab</i> 148-149, 277, 344-345, 438-439, 652-653 <i>Mini LAB</i> 19, 574</p>
<p>PO 4. Compare risks and benefits of the following technological advances:</p> <ul style="list-style-type: none"> <li>• radiation treatments</li> <li>• genetic engineering (See Strand 4 Concept 2)</li> <li>• airbags (See Strand 5 Concept 2)</li> </ul>	<p>SE: 55-56, 554-556 <i>Science and History</i> 248 TWE: A 55 AS 556 DIN 554</p>

STANDARDS	PAGE REFERENCES
<b>Strand 5: Physical Science</b> Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings.	
<b>Concept 1: Properties and Changes of Properties in Matter</b> Understand physical and chemical properties of matter.	
PO 1. Identify different kinds of matter based on the following physical properties: <ul style="list-style-type: none"> <li>• states</li> <li>• density</li> <li>• boiling point</li> <li>• melting point</li> <li>• solubility</li> </ul>	SE: 458-461, 477-483, 486, 570-577, 671-675, 736-737 <i>Lab</i> 484, 496-497, 583 <i>Launch Lab</i> 449 TWE: SJ 482
PO 2. Identify different kinds of matter based on the following chemical properties: <ul style="list-style-type: none"> <li>• reactivity</li> <li>• pH</li> <li>• oxidation (corrosion)</li> </ul>	SE: 461-465, 570-577, 578-582, 584-588, 643, 702-705 <i>Lab</i> 466-467 TWE: IL 462 QD 463, 464
PO 3. Identify the following types of evidence that a chemical reaction has occurred: <ul style="list-style-type: none"> <li>• formation of a precipitate</li> <li>• generation of gas</li> <li>• color change</li> <li>• absorption or release of heat</li> </ul>	SE: 462-463, 573, 632-634, 641-645, 648-649, 710-711 <i>Mini LAB</i> 460, 580, 648 TWE: AS 456
PO 4. Classify matter in terms of elements, compounds, or mixtures.	SE: 450-454, 516-524, 570-577, 615-621, 664-665, 736-737 <i>National Geographic</i> 666 TWE: DIN 459 LD 460 SJ 452
PO 5. Classify mixtures as being homogeneous or heterogeneous.	SE: 452-454, 664-665 <i>Lab</i> 457 <i>Mini LAB</i> 574 <i>National Geographic</i> 666 TWE: CU 456 DI 454 DIN 459 FYI 453
PO 6. Explain the systematic organization of the periodic table.	SE: 516-524, 572-576, 578-582, 584-589, 604-605, 616 <i>Lab</i> 525 TWE: FF 523 TPK 516 UA 518
PO 7. Investigate how the transfer of energy can affect the physical and chemical properties of matter.	SE: 159-160, 164-167, 203-204, 256-257, 290-295, 343, 464-465, 476-482 <i>Integrate Health</i> 205

STANDARDS	PAGE REFERENCES
<b>Concept 2: Motion and Forces</b> Understand the relationship between force and motion.	
PO 1. Demonstrate velocity as the rate of change of position over time.	SE: 38-44, 74 <i>Lab 58-59</i> <i>Launch Lab 37</i> TWE: AS 46 LD 50 QD 41
PO 2. Identify the conditions under which an object will continue in its state of motion (Newton's 1 <sup>st</sup> Law of Motion).	SE: 52-56 <i>Lab 58-59</i> TWE: FF 55
PO 3. Describe how the acceleration of a body is dependent on its mass and the net applied force (Newton's 2 <sup>nd</sup> Law of Motion).	SE: 47-50, 68-70, 76-78, 81-82 <i>Lab 57</i> TWE: CU 51
PO 4. Describe forces as interactions between bodies (Newton's 3 <sup>rd</sup> Law of Motion).	SE: 83-84, 86-88 <i>National Geographic 85</i> TWE: CU 88 FF 85 QD 84 TPK 83
PO 5. Create a graph devised from measurements of moving objects and their interactions, including: <ul style="list-style-type: none"> <li>• position-time graphs</li> <li>• velocity-time graphs</li> </ul>	SE: 41-43, 50 <i>Lab 58-59</i> <i>Math Skill Handbook 830</i> <i>National Geographic 49</i> TWE: AS 46 LD 50
<b>Concept 3: Transfer of Energy</b> Understand that energy can be stored and transferred.	
No performance objectives at this grade level	
<p style="text-align: center;"><b>Strand 6: Earth and Space Science</b></p> Earth and Space Science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world (NSES, 1995). By studying the Earth from both a historical and current time frame, students can make informed decisions about issues affecting the planet on which they live.	
<b>Concept 1: Structure of the Earth</b> Describe the composition and interactions between the structure of the Earth and its atmosphere.	
No performance objectives at this grade level	
<b>Concept 2: Earth's Processes and Systems</b> Understand the processes acting on the Earth and their interaction with the earth systems.	
No performance objectives at this grade level	
<b>Concept 3: Earth in the Solar System</b> Understand the relationships of the Earth and other objects in the solar system.	
No performance objectives at this grade level	

## Codes Used for TWE Pages

A	Activity
AIL	Alternative Inquiry Lab
AS	Assessment
CB	Content Background
CU	Check for Understanding
CUL	Cultural Diversity
CUR	Curriculum Connection
CYD	Communicating Your Data
DI	Discussion
DIN	Differentiated Instruction
EA	Error Analysis
FF	Fun Fact
FYI	Teacher FYI
IL	Inquiry Lab
IM	Identifying Misconceptions
LD	Lab Demonstration
QD	Quick Demo
RE	Reteach
RES	Research
SJ	Science Journal
TPK	Tie to Prior Knowledge
UA	Use an Analogy