Return to the Moon
Science Standard Articulated by Grade Level

Strand 1: Inquiry Process			
Concept 1: Observations, Predictions and Hypotheses Observe, ask questions, and make predictions			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 3. Locate information (e.g., book, article, website) related to an investigation.	PO 3. Locate research information, not limited to a single source, for use in the design of a controlled investigation.		
Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.	PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.	PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.	PO 1. Demonstrate safe behavior and appropriate procedures (e.g., use and care of technology, materials, organisms) in all science inquiry.
PO 4. Measure using appropriate tools (e.g., ruler, scale, balance) and units of measure (i.e., metric, U.S. customary).	PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).	PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).	PO 4. Perform measurements using appropriate scientific tools (e.g., balances, microscopes, probes, micrometers).
PO 5. Record data in an organized and appropriate format (e.g., t-chart, table, list, written log).	PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.	PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.	PO 5. Keep a record of observations, notes, sketches, questions, and ideas using tools such as written and/or computer logs.
Concept 3: Analysis and Conclusions Analyze and interpret data to explain correlations and results: formulate new questions.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**

PO 2. Analyze whether the data is consistent with the proposed explanation that motivated the investigation**.**			
PO 3. Evaluate the reasonableness of the outcome of an investigation.	PO 3. Evaluate the observations and data reported by others.	PO 3. Analyze results of data collection in order to accept or reject the hypothesis	PO 3. Interpret data that show a variety of possible relationships between two variables, including: • Positive relationship • Negative relationship • No relationship
		PO 4. Determine validity and reliability of results of an investigation.	
	PO 5. Analyze the results from previous and/or similar investigations to verify the results of the current investigation.	PO 5. Formulate a conclusion based on data analysis.	PO 5. Explain how evidence supports the validity and reliability of a conclusion.
			PO 6. Identify the potential investigational error that may occur (e.g., flawed investigational design, inaccurate measurement, computational errors, unethical reporting).
Concept 4: Communication Communicate Results of Investigations			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Communicate verbally or in writing the results of an inquiry.			
	PO 2. Display data collected from a controlled investigation.	PO 2. Display data collected from a controlled investigation.	
PO 3. Communicate with other groups or individuals to compare the results of a common	PO 3. Communicate the results of an investigation with appropriate use of qualitative and quantitative	PO 3. Communicate the results of an investigation with appropriate use of qualitative and	

investigation.	information.	quantitative information.	
	PO 5. Communicate the results and conclusion of the investigation.	PO 5. Communicate the results and conclusion of the investigation.	PO 5. Communicate the results and conclusion of the investigation.
Strand 2: History and Nature of Science			
Concept 1: History and Nature of Science as a Human Endeavor Identify individual, cultural and technological contributions to scientific knowledge.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Percy Lavon Julian [scientist], supports Strand 4; Niels Bohr [scientist], supports Strand 5; Edwin Hubble [scientist], supports Strand 6).	PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Jacques Cousteau [inventor, marine explorer], supports Strand 4; William Beebe [scientist], supports Strand 4; Thor Heyerdahl [anthropologist], supports Strand 6).	PO 1. Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations (e.g., Rachel Carson [scientist], supports Strand 4; Luis Alvarez [scientist] and Walter Alvarez [scientist], support Strand 6; Percival Lowell [scientist], supports Strand 6; Copernicus [scientist], supports Strand 6).	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).
	PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., Cell Theory, sonar, SCUBA, underwater robotics).	PO 2. Describe how a major milestone in science or technology has revolutionized the thinking of the time (e.g., global positioning system, telescopes, seismographs, photography).	

	PO 4. Describe the use of technology in science-related careers.	PO 4. Analyze the use of technology in science-related careers.	PO 4. Evaluate career opportunities related to life and physical sciences.
Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Provide examples that support the premise that science is an ongoing process that changes in response to new information and discoveries (e.g., space exploration, medical advances).	PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.	PO 1. Describe how science is an ongoing process that changes in response to new information and discoveries.	PO 1. Apply the following scientific processes to other problem solving or decision making situations: observing; questioning; communicating; comparing; measuring; classifying; predicting; organizing data; inferring; generating hypotheses; identifying variables.
	PO 3. Apply the following scientific processes to other problem solving or decision making situations: observing; questioning; communicating; comparing; measuring; classifying; predicting; organizing data; inferring; generating hypotheses; identifying variables.	PO 3. Apply the following scientific processes to other problem solving or decision making situations: observing; questioning; communicating; comparing; measuring; classifying; predicting; organizing data; inferring; generating hypotheses; identifying variables.	
Strand 3: Science in Personal and Social Perspectives			
Concept 2: Science and Technology Develop viable solutions to a need or problem.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
	PO 1. Propose viable methods of	PO 1. Propose viable methods of	PO 1. Propose viable methods of

	responding to an identified need or problem.	responding to an identified need or problem.	responding to an identified need or problem.
	PO 2. Compare possible solutions to best address an identified need or problem.	PO 2. Compare possible solutions to best address an identified need or problem.	PO 2. Compare possible solutions to best address an identified need or problem.
Strand 5: Physical Sciences			
Concept 2: Motion and Forces Understand the relationship between force and motion.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Describe the following forces: • gravity • friction			
Concept 3: Transfer of Energy Understand that energy can be stored and transferred.			
	PO 1. Identify various ways in which electrical energy is generated using renewable and nonrenewable resources (e.g., wind, dams, fossil fuels, nuclear reactions).		
Strand 6: Earth and Space Science			
Concept 1: Structure of Earth Describe the composition and interactions between the structure of the Earth and its atmosphere.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
		PO 1. Classify rocks and minerals by the following observable properties: • grain • color	

		• texture • hardness	
Concept 2: Earth's Processes and Systems Understand the processes acting on the Earth and their interaction with the Earth systems.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
PO 1. Describe how the Moon's appearance changes during a four-week lunar cycle.			
Concept 3: Earth in the Solar System Understand the relationship of the Earth and other objects in the solar system.			
Grade 5	**Grade 6**	**Grade 7**	**Grade 8**
		PO 1. Explain the phases of the Moon in terms of the relative positions of the Earth, Sun, and Moon.	
		PO 2. Construct a model for the relative positions of the Earth, Sun, and Moon as they relate to corresponding eclipses.	
PO 3. Describe various objects in the sky (e.g., asteroids, comets, stars, meteors/shooting stars).		PO 3. Explain the interrelationship between the Earth's tides and the Moon.	
PO 6. Describe efforts to explore space (e.g., Apollo missions, space shuttles, Hubble space telescope, space probes). (See Strand 2)			

Return to the Moon Mission
Workplace Skills Standards Articulated by Grade Level
Includes those covered via pre-mission activities.

STANDARD 1 - Students use principles of effective oral, written and listening communication skills to make decisions and solve workplace problems.	
ESSENTIALS (4-8):	
• 1WP-E7. Identify the relevant details and facts of written materials	
	PO 2. Identify relevant facts contained in selected written material
PROFICIENCY (Grades 9-12):	
• 1WP-P2. Respond to verbal and nonverbal messages in ways that demonstrate understanding	
	PO 1. Respond appropriately to verbal messages
	PO 2. Respond appropriately to nonverbal message
1WP-P3. Communicate a clear message and respond to listener feedback	
	PO 1. Formulate a clear message using acceptable format
	PO 2. Respond appropriately to listener feedback
1WP-P4. Participate in conversation, discussion and/or group presentations using verbal and nonverbal communication with appropriate style and tone for audience and occasion	
	PO 1. Apply group interaction skills (verbal and nonverbal)
	PO 2. Adapt style and tone to audience and occasion (verbal and nonverbal)
• 1WP-P8. Summarize information from reading material, clearly and succinctly articulating its major points and proposals	
	PO 1. Identify major points from written materials
	PO 2. Summarize major points clearly and concisely
1WP-P9. Infer and locate the meaning of unknown or technical vocabulary	
	PO 1. Using available resources, determine the meaning of unknown or technical vocabulary
DISTINCTION (Honors)	
1WP-D5. Draw conclusions and make predictions from technical information and data	
1WP-D7. Express and defend their points of view by formulating sound, rational arguments and applying the art of persuasion and debate	
STANDARD 2 - Students apply computation skills and data analysis techniques to make decisions and solve workplace problems.	
ESSENTIALS (4-8):	
2WP-E1. Apply math standards 1-6 to a variety of workplace scenarios	
PROFICIENCY (Grades 9-12):	
• 2WP-P1. Select and use appropriate computation techniques (i.e., mental, paper and pencil, and technology) to solve problems and determine the accuracy of results	
	PO 1. Select appropriate computation techniques, such as averaging, estimation, statistical techniques, and appropriate electronic calculations
	PO 2. Apply selected technique to solve problems
	PO 3. Evaluate accuracy of results
2WP-P2. Construct projections and trends from raw data, charts, tables and graphs that summarize data from real-world situations	
	PO 1. Evaluate data from real-world situations
	PO 2. Construct projections and trends
DISTINCTION (Honors):	
2WP-D1. Analyze inferences from charts, tables and graphs that summarize data	

STANDARD 3 - Students apply critical and creative thinking skills to make decisions and solve workplace problems.	
ESSENTIALS (4-8):	
3WP-E1. Utilize information acquired from several sources and transfer information learned in one situation to another.	
	PO 1. Research a designated topic using a wide array of information sources
	PO 2. Analyze the information obtained from the research
	PO 3. Classify the information obtained from the research
	PO 4. Compare the information to a new situation
3WP-E2. Devise and implement a plan of action by specifying goals and constraints	
	PO 1. Define goals and objectives
	PO 3. Identify constraints to achieving goals
	PO 4. Identify resources needed to accomplish goals
3WP-E3. Generate alternatives, consider risks, evaluate and choose solutions	
	PO 1. Select from possible solutions in a designated scenario
	PO 2. Evaluate possible solutions in a designated scenario
	PO 3. Identify risks in a designated scenario
	PO 4. Assess risks and risk factors in a designated scenario
• 3WP-E4. Monitor progress and make adjustment to meet stated objectives	
	PO 1. Identify activities for given objectives
	PO 3. Evaluate progress towards objective
	PO 4. Revise activities when necessary to achieve objective
3WP-E5. Reflect on the action taken to determine what has been gained, lost or achieved	
	PO 1. Evaluate what has been gained, lost or achieved
• 3WP-E6. Identify a need for data, obtain it and develop a validation instrument for determining its accuracy	
	PO 1. Compare the results with the criteria for accuracy
	PO 2. Collect data to analyze workplace problems
PROFICIENCY (Grades 9-12):	
3WP-P1. Develop a plan to solve complex problems by gathering, selecting and analyzing data; include determining the history and politics of the situation	
	PO 1. Identify the problem
	PO 2. Select needed data
	PO 3. Analyze data
	PO 4. Develop a plan within the context of the workplace to solve problem
• 3WP-P2. Identify and allocate available resources (e.g., time, money, materials, facilities and human)	
	PO 1. Identify available resources
	PO 2. Allocate resources
3WP-P3. Design and justify solutions by tracking and evaluating the results	
	PO 1. Design justifiable solution
	PO 2. Monitor results
	PO 3. Evaluate results
3WP-P4. Demonstrate the ability to adapt new information to changing situations and requirements	
	PO 1. Demonstrate the ability to apply new information to changing situations and requirements
STANDARD 4 - Students work individually and collaboratively within team settings to accomplish objectives.	

ESSENTIALS (Grades 4-8):	
• 4WP-E3. Exert a high level of effort and perseverance toward goal attainment, as a team member	
	PO 1. Identify the team goal
	PO 2. Identify the team member roles and responsibilities
• 4WP-E4. Assume leadership roles in team settings	
	PO 2. Examine self roles/skills in a group setting
	PO 3. Demonstrate leadership roles/skills in a group
PROFICIENCY (Grades 9-12):	
4WP-P1. Demonstrate ability to work with others from diverse backgrounds, including identifying individual interests, aptitudes and skills; teach others new skills	
• 4WP-P2. Understand group dynamics	
	PO 1. Identify personal qualities
	PO 2. Demonstrate an understanding of group dynamics
	PO 3. Work well with others
	PO 4. Teach others new skills
• 4WP-P3. Work toward consensus by exchanging resources and resolving divergent interests	
	PO 1. Demonstrate the ability to reach consensus by resolving divergent interests
• 4WP-P4. Monitor individual performance and team effectiveness	
	PO 1. Conduct periodic checks of individual team member's contributions and the team's progress in obtaining goals
• 4WP-P5. Provide constructive feedback	
	PO 2. Give constructive feedback to team participants that strengthens individual and group performance
• 4WP-P6. Assume leadership roles in team settings to accomplish tasks	
	PO 1. Communicate thoughts and ideas to clarify roles and responsibilities
	PO 2. Delegate tasks and responsibilities effectively
	PO 3. Motivate team to accomplish tasks
	PO 4. Evaluate team effectiveness
• 4WP- P8. Negotiate solutions to identified conflicts by separating people from the problem; focusing on interests, not positions; inventing options for mutual gain; and insisting on the use of objective criteria	
	PO 1. Apply negotiation skills to solve conflicts
DISTINCTION (Honors):	
• 4WP-D1. Demonstrate teamwork and negotiation skills in innovative and effective ways to accomplish tasks	
STANDARD 5 - Students will demonstrate a set of marketable skills that enhance career options.	
ESSENTIALS (4-8):	
• 5WP-E1. Evaluate areas of interest and/or potential career choices	
	PO 1. Identify areas of interest (e.g., personal, career)
	PO 2. Evaluate individual skills
	PO 3. Evaluate a variety of potential career choices
• 5WP-E3. Demonstrate the connection between academic skills and career pathways by identifying required education and training to achieve career choice(s)	
	PO 1. Identify academic preparation necessary for a variety of careers
• 5WP-E4. Identify careers which capitalize on individual strengths and interests	
	PO 1. Identify areas of interest (e.g., personal, career)
	PO 2. Evaluate individual skills

• 5WP-E5. Apply the basic academic skills to develop a resume, job application and interviewing techniques	
	PO 2. Complete a job application
STANDARD 6 - Students illustrate how social, organizational and technological systems function.	
ESSENTIALS (Grades 4-8):	
• 6WP-E1. Identify the factors impacting the level of effectiveness of systems	
STANDARD 7 - Students demonstrate technological literacy for productivity in the workplace.	
ESSENTIALS (Grades 4-8):	
• 7WP-E1. Demonstrate basic computer operation skills in a variety of applications to organize information	
	PO 1. Use technology to retrieve, organize and manipulate electronic information using media such as CD-ROM, videodisks and telecommunication systems