

GIFTED PROGRAM CURRICULUM TEMPLATE
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Unit Title:		Grade: 3
Mission to Mars		Duration: 7-10 weeks
Unit Rationale	<p>For centuries, the planet Mars has eluded philosophers, astronomers, physicists and others. Space exploration and planetary study has been an important topic among governments over the years. Scientists have been closely studying Mars for decades now and it is the planet they are looking at most as a haven for a human colony. Data results from important missions such as the Mars Odyssey, Global Surveyor and Pathfinder have only posed more interest among scientists as they seem to move closer and closer to the possibility of human colonization of Mars.</p> <p>In this unit students will explore the geography, climate, and history of the planet Mars. Students will analyze real data from NASA missions and will gain an understanding of NASA's "Follow the Water" strategy for Mars exploration. They will investigate previous, current and future missions to Mars and the importance of knowledge gained about the red planet. They will design missions to Mars including booster capabilities, budget, power, and safety. Students will analyze what humans need to survive and thrive in a colony on another planet and will design the systems needed for a colony. They will be able to identify and research problems related to the exploration of Mars and propose possible solutions that will continue to promote space exploration.</p>	
Essential Question(s)	How and why are humans exploring the planet Mars? How do we use the information compiled from missions to Mars to improve human life?	
Measurable Learner Objectives	<p>By the end of this unit, gifted students will be able to:</p> <ul style="list-style-type: none"> • Gather, analyze, and apply information about the role of Mars in mythology and science fiction throughout history, the surface, climate and atmosphere characteristics of Mars, and data from various past and present missions to Mars. • Communicate effectively in writing, verbally, and visually a proposal for a system that is to be included in the establishment of a human colony on Mars and an advertisement that will attract colonists and visitors to Mars. 	

	<ul style="list-style-type: none"> Analyze problems and apply appropriate problem solving techniques to solve problems related to establishing a healthy and productive human colony on Mars, and how the first colonists on Mars will be chosen. Think critically about reasons for establishing a human colony on Mars and the systems that should be included on Mars for a healthy and productive colony. Work responsibly as an individual, group member, and leader when developing and executing a plan for a human colony on Mars, when designing missions to Mars, and when analyzing data from NASA about Mars. Apply and analyze appropriate research skills when investigating aspects of the systems that should be included in a Mars colony. Think affectively about what life would be like for the first colonists of Mars.
<p>Show-Me Standards</p>	<p>Knowledge: Communication Arts: 1, 3, 4, 5, 6 Social Studies: 6, 7 Math: 1 Science: 1, 4, 5</p> <p>Performance: Goal 1.1, 1.2, 1.4, 1.5, 1.8, 1.10 Goal 2.1, 2.3, 2.4, 2.7 Goal 3.1, 3.2, 3.5, 3.8 Goal 4.1, 4.3, 4.4, 4.5, 4.6</p>
<p>District Goals/Objectives</p>	<p>Communication Arts Grade 5 <i>Reading Nonfiction:</i> Apply information in format, graphics, sequence, maps, diagrams, charts and index to clarify and connect concepts to the main ideas. <i>Reading Nonfiction:</i> Use details from the text(s) to : 1) restate main idea and supporting details, 2) sequence events, 3) identify and explain cause and effect, 4) compare and contrast, 5) make predictions, 6) make inferences, 7) evaluate the accuracy of the information, and 8) identify and interpret author’s ideas and purpose. <i>Writing Process:</i> Follow a writing process to: 1) organize information in graphic organizer, and 2) apply writing process to write effectively in various forms and types of writing. <i>Various Forms and Types of Writing:</i> Write well-organized communications in a selected form appropriate to a specific audience and purpose.</p>

	<p><i>Speaking Skills and Strategies:</i> In discussions and presentation: 1) give organized presentations that demonstrate a clear viewpoint, and 2) select and use appropriate public speaking techniques such as rate, pace and enunciation.</p> <p><i>Research Process Skills:</i> Develop research questions in order to establish a focus and purpose for a project.</p> <p><i>Research Process Skills:</i> Locate and use various resources to acquire information to answer questions.</p> <p><i>Research Process Skills:</i> Use a specified note-taking format to record relevant information.</p> <p><i>Research Process Skills:</i> Give credit for others' ideas, images and information by listing sources used in research.</p> <p><i>Analyze and Evaluate Oral and Visual Media:</i> Analyze messages conveyed in various media.</p> <p>Art Grade 5</p> <p><i>Art Production:</i> Recognize and draw vertical, horizontal, diagonal, curved, zigzagged, broken, thick and thin lines.</p> <p><i>Art Production:</i> Recognize, distinguish and draw organic and geometrical 2-D shapes and 3-D forms.</p> <p><i>Art Production:</i> Recognize and create with clay 3-D sculptural forms.</p> <p><i>Art Production:</i> Recognize and create with Model Magic a 3-D sculptural form.</p> <p><i>Criticism and Analysis:</i> Distinguish and describe landscape art works.</p> <p><i>Criticism and Analysis:</i> Identify, compare and contrast 2-D and 3-D media in works of art.</p> <p><i>Criticism and Analysis:</i> Discuss, compare and contrast using the elements of art (color, line, shape, space, texture) in works of art.</p>
Bloom's Taxonomy Levels	Application, Analysis, Synthesis, Evaluation
Scope and Sequence Skills	Information Processing, Communication, Problem Solving, Critical Thinking, Responsibility, Research Skills, Affective Thinking
Instructional Strategies/ Student Activities	<p>Working as a group gifted students will:</p> <ul style="list-style-type: none"> • Complete a Venn diagram comparing and contrasting the surface, climate and atmosphere characteristics of Earth and Mars. • Review completed fictional resumes for colonist applicants and support reasons for choosing which applicants will be the first colonists on Mars. • Determine and describe in a chart the resources humans need to live everyday.

- Determine and describe in a chart the purposes for colonizing Mars.
- Determine and describe using Inspiration the systems colonists will need to survive and thrive on Mars using determined resources humans need to live everyday and the determined purposes for colonizing Mars.
- Brainstorm on a graphic organizer and discuss issues involved in transporting humans and supplies to Mars.
- Conduct an experiment to simulate the making of a crater and observe, record, and interpret data and physical characteristics.
- Create a Power Point game show about Mars and its explorations.

Working in small groups gifted students will:

- Design a vehicle to travel on the surface of Mars based on knowledge of current Martian vehicles and the surface of Mars.
- Use Inspiration software to diagram common myths and facts about Mars throughout history.
- Design a travel brochure using Microsoft Publisher to the planet Mars using surface, climate and atmosphere information.
- Design a Power Point presentation on past and present missions to Mars and the importance of the data collected from the missions.
- Using an image from NASA (Mars Orbiter Camera aboard Mars Global Surveyor) identify, describe, measure, and analyze various physical and geographical features of Olympus Mons including impact craters, volcanoes, stratification (canyons), and river beds.
- Using an image from NASA (Mars Orbiter aboard Mars Global Surveyor) describe surface history of various surface features of Mars by using the Principles of Superposition, Cross-Cutting Relationships, and Horizontal Bedding.
- Using an image from NASA (Thermal Emission Spectrometer aboard Mars Global Surveyor) identify, describe, and analyze the amount of albedo, or percentage of visible and infrared light received from the sun being reflected off the Tharsis Province.

- Using an image from NASA (Mars Orbiter Laser Altimeter aboard Mars Global Surveyor) identify, describe, and analyze the topography of the Tharsis Montes Region.
- Define and describe important characteristics of living organisms, then conduct an experiment similar to a 1976 Mars Viking Lander experiment, using rock samples to determine whether there is/was anything alive on Mars using the defined characteristics.
- Determine important science goals to study when exploring Mars based on NASA's "Follow the Water" strategy for Mars exploration.
- Identify five science goals for a mission to Mars and support reasoning for choosing the goals and explain how the goals align with NASA's "Follow the Water" strategy for Mars exploration.
- Determine limits, or engineering constraints, of a mission to Mars including booster capabilities, budget, power, and safety.
- Using determined science goals and engineering constraints, use the MarsBound! Game to build a spacecraft and maintain a design log of its components, mass, power, and costs.
- Write a proposal to NASA about the mission design to Mars including science goals, engineering constraints, and spacecraft design.

Individually gifted students will:

- Construct a scale model solar system.
- Simulate a planet core sampling to compare and contrast known and unknown core samples and understand how surface core samples can tell about the history and make-up of Mars.
- Complete fictional resumes for colonist applicants.
- Simulate, using various Rover commands, the challenges of operating a planetary rover and problem solve through obstacles, then determine time to complete the mission and the number of rock samples collected.
- Conduct an experiment to create a miniature model of a volcano, produce a sequence of lava flows and observe, record, and interpret the history of a volcano based on collected data.

	<ul style="list-style-type: none"> • Draw a Martian based on excerpts from science fiction and draw a second Martian based on scientific data then compare and contrast the characteristics of the two Martians using a Venn diagram. • Design a 3-D plant or animal life form that might survive on Mars. • Research characteristics of a Mars Rover or Spacecraft and create an edible Rover or Spacecraft based on its characteristics. • Design a Martian space suit.
Assessment(s)	<p>Pre-Assessment: Quiz</p> <p>Performance Event: Produce and present a written proposal for a system that is to be included in the Mars colony and design an aerial view illustration of the systems of the human colony on Mars.</p> <p>Performance Event: Role play a newspaper reporter who interviews at least three different colonists on Mars about how they feel about being a colonist and write a magazine article about the interviews using Microsoft Publisher.</p> <p>Post-Assessment: Quiz and Student Self-Assessment</p>
Resources	<p>Technology:</p> <ul style="list-style-type: none"> • Video: “Assignment Discovery: Destination Mars.” Discovery Channel School. Discovery Communications, Inc. 1997 • Video: “Assignment Discovery” Life on Mars.” Discovery Channel School. Discovery Communications, Inc. 1997. • Video: “Windows on Mars.” Produced by the National Endowment for the Arts. <p>Characteristics (Atmosphere, Surface, Climate, Moons):</p> <ul style="list-style-type: none"> • http://www.byu.edu/ipt/projects/middleages/LifeTimes/People.html • http://www.byu.edu/ipt/projects/middleages/LifeTimes/People.html • http://seds.lpl.arizona.edu/nineplanets/nineplanets/phobos.html • http://www.germantown.k12.il.us/html/Mars.html • http://www.ucls.uchicago.edu/MartianSunTimes/ • http://www.exploringmars.com/science/ataglance.html

- <http://mars.jpl.nasa.gov/mep/science/index.html>
- <http://www.ucls.uchicago.edu/MartianSunTimes/>

Colonization:

- <http://lyra.colorado.edu/sbo/mary/redplanet.html>
- <http://mmp.planetary.org/syste/syste.htm>
- <http://www.sciam.com/1999/0399space/0399mckay.html>

Missions:

- http://www.athena.cornell.edu/educators/lp_o2.html

Miscellaneous:

- <http://www.discoveryschool.com>
Lessons: "Destination Mars", "Exploration of Mars", "Mars", "The Path to Mars"
- <http://quest.arc.nasa.gov/mars/teachers/tg/index.html>

Mythology:

- http://calspace.ucsd.edu/marsnow/library/myths_and_science_fiction/myths1-introduction.html

Science Fiction:

- <http://humbabe.arc.nasa.gov/mgcm/fun/pop.html>

Books/Articles:

- Hopping Egan, Lorraine. Kids Discover: Mars. Kids Discover. 1998.
- Skurzynski, Gloria. Discover Mars. Washington D.C.: National Geographic Society. 1998.
- Simon, Seymour. Mars. New York: Morrow and Company, Inc. 1987.
- Sumners, Carolyn, and Pat Rawlings. An Earthling's Guide to Mars. New York: The McGraw-Hill Companies, Inc. 1999.

Other:

- ASU Mars Education Program.
<http://marsed.asu.edu/activities.php>.
MSIP Student Handbook and Activity Guide, MSIP Teacher Guide, MSIP Resource Manual, Mapping the Surface of a Planet Student Guide, Mapping the Surface of a Planet Teacher Guide, Mapping the Surface of a Planet Activity One Image, Activity One Context Image, Activity Two Image, Activity Three Image, Mars

	<p><u>Activities- Teacher Resources, MarsBound! Mission to the Red Planet Student Guide, MarsBound! Mission to the Red Planet Teacher's Guide, MarsBound! Mission to the Red Planet Equipment Cars, MarsBound! Mission to the Red Planet Design Mat.</u></p>
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