

Course Title:
Fly Me To The Moon

Length:
One Quarter
Grade 5

Primary Content:
Gifted & Talented

School:
Pierrepoint

Embedded Content:
English Language Arts, Science, Math, Career Readiness, Life Literacies
and Key Skills

Initial BOE Approval Date (Born on):
June 24, 2024

RUTHERFORD PUBLIC SCHOOLS
Rutherford, New Jersey

GIFTED AND TALENTED DEPARTMENT

FLY ME TO THE MOON - GRADE 5

1. Introduction/Overview/Philosophy

Examine the forces of flight, and the design process engineers use to develop airplanes that manage these flight conditions. Examine how flight has brought us to places like the moon. Consider what we would need to live on the moon (or on other planets), research the possibilities and examine the social, moral and scientific implications of trying to colonize another planet or the moon. Students will lastly participate in project based learning that examines these needs.

Course Outline

Fly me to the Moon is a STEM/Science unit that allows students to study space science through the lens of engineering and science as well as social, emotional and cultural eyes. Students will learn the background of space exploration and examine the implications of our reach outside our world. Students will participate in hands-on activities that will challenge them and guide them through the design process.

The variety of enriching and thought-provoking learning experiences offered in the Gifted and Talented Program incorporates three levels of enrichment intended to promote critical thinking.

Type I—General Exploratory Activities (Content)- Exposure to disciplines, authors or events not covered in the regular curriculum. Children can be exposed to such areas long enough to be attracted to some of them for individual study.

Type II—Group Process Activities (Operations)- Students are taught skills for expanding their thinking and feeling processes. Among these activities are: brainstorming, analysis, classification, general inquiry, observation and evaluation.

Type III—Real Problem Solving (Products)- This type of enrichment involves children in thinking, feeling and doing in the manner of the practicing professional. Children are encouraged to focus on solvable problems so that they might become empowered to create products that influence outcomes and make a difference in the world.

In addition, a goal of the Gifted and Talented Program is to include activities aimed at developing the affective domain of our students, such as: valuing, responding, receiving/attending. It is through both thinking and feeling that our students will develop into thoughtful, contributing, valuable members of society.

2. Objectives

1. Develop the essential skills of communicating, creative problem solving, and logical thinking
2. Calculate Ratios, surface area, measurements, drawing to scale and reading scale drawings
3. Apply math problem-solving strategies to real life situations
4. Design and construct a model, applying principles of STEM and engineering
5. Conduct a short research project to better understand different concepts of space science
6. Understand force and motion, center of gravity/pressure, and aerodynamics
7. Understand kinetic and potential energy
8. Make designs for a device based on specific criteria, choose which design will perform better based on the criteria, build and iteratively test a device

A. Curriculum Objectives for Inquiry

Students will be able to refine and broaden

1. Divergent thinking
 - a. Creative thinking
 - b. Inventive thinking
 2. Convergent thinking
 - a. Deductive thinking
 - b. Analytical thinking
 - c. Evaluative thinking
 3. Interpretive thinking
 4. Research skills
1. In the area of **divergent thinking** students will:
 - a. use **creative thinking** to:
 1. use fluent and flexible thinking to brainstorm ideas/solutions
 2. develop, produce, and dramatize
 3. adapt story versions
 4. illustrate interpretations
 5. use the five-step writing process to write original pieces
 6. create and construct original designs with a variety of manipulatives and art supplies
 - b. use **inventive thinking** to:
 1. use fluent and flexible thinking to brainstorm ideas/solutions
 2. adapt items to be used for an alternate purpose
 2. In the area of **convergent thinking** students will:
 - a. use **deductive thinking** to:
 1. formulate predictions/hypothesis
 - b. use **analytical thinking** to:
 1. analyze story elements
 2. compare and contrast story elements/manipulatives/interpretations

- 3. interpret visual representations
- c. use **evaluative thinking** to:
 - 1. judge character traits and motivation
 - 2. compare, rate, rank, revise, and eliminate information
 - 3. determine cause and effect
 - 4. make conclusions about given information
 - 5. self-assess using set criteria
- 3. In the area of **interpretive thinking** students will:
 - a. use shared inquiry to:
 - 1. build awareness of interpretive issues in a story
 - 2. analyze character motivation and development
- 4. In the area of **research skills** students will:
 - a. access and select meaningful information using the Internet, books, videos, and other media
 - b. use the five-step writing process of prewriting, drafting, editing, conferencing, and publishing for a variety of audiences and purposes
 - c. use a variety of computer software to record research
 - d. synthesize knowledge of a topic into self-selected culminating activities
 - e. cite references
 - f. Present to/share research with others
- a. **Skills**
 - i. Improvement of reasoning ability
 - ii. Development of creativity and personal development

B. New Jersey Core Curriculum Content Standards

Reading Standards:

RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections.

RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears.

RI.CT.5.8. Compare and contrast the authors' approaches across two or more informational texts within the same genre or about texts on the same or similar topics. (Students may compare and contrast texts about models that describe the effect that climate change has on ecosystems.)

SL.PE.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

- A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
- B. Follow agreed-upon rules for discussions and carry out assigned roles.

- C. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- D. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

SL.II.5.2. Summarize a written text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally).

SL.PI.5.4. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

W.WR.5.5. Establish a central idea about a topic, investigation, issue or event and use and quote several sources to support the proposed central idea

W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources.

5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down.

5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global

9.4.5.TL.5: Collaborate digitally to produce an artifact

Career Readiness, Life Literacies, and Key Skills Practices

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

Practice	Description
Act as a responsible and contributing community members and employee.	Students understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
Attend to financial well-being.	Students take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
Consider the environmental, social and economic impacts of decisions.	Students understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

Practice	Description
Model integrity, ethical leadership and effective management.	Students consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
Plan education and career paths aligned to personal goals.	Students take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

3. Proficiency Levels

Students in grades five are identified as “Gifted and Talented.” Students that have received 2 points on the Gifted and Talented screening will be offered all 4 available grade level courses.

Differentiating Instruction for Students with Special Needs: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students. Examples of Strategies and Practices that Support

Students with Disabilities and Students with 504 plans

- Use of visual and multi-sensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Gifted & Talented Students

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven
- Real-world problems and scenarios

English Language Learners

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- Word walls references
- Sentence frames
- Think-pair-share
- Cooperative learning groups
- Teacher think-alouds

4. Methods of Assessment

A variety of assessments will be provided including, but not limited to, the following items:

Tests

Quizzes

Homework

Classwork
Class Participation/Group Participation
Writing Assignments
Oral Presentations
Individual Projects, Presentations and Reports
Group Projects, Presentations and Reports
Technology Projects
Journals
Teacher observation
Teamwork (participation, level of involvement, quality of work as a team member)
Sample collections/portfolios

5. Grouping

Small group pull-out for students identified as “Gifted and Talented” according to the Rutherford School District Gifted and Talented Policy 2464 (revised December 7, 2020) to be run as a grade 5 cycle course.

6. Articulation/Scope & Sequence

Course length is one quarter.

Major Products:

- a. Research on space, flight and engineering
- b. Planning and Design
- c. Completed projects including “eggdrop”, stomp rockets, rovers, gliders, Moon PBL

7. Resources

a. References

<https://www.jpl.nasa.gov/edu/teach/activity/stomp-rockets/>

<https://www.nasa.gov/directorates/armd/aeronautics-stem/>

<https://www.sciencebuddies.org/stem-activities/balloon-car>

<https://ssec.si.edu/fed-space-resources-space-force-stem>

<https://www.pbs.org/wgbh/nova/article/best-space-documentaries-streaming/>

<https://avidopenaccess.org/resource/mysteries-of-space-launch-lesson/>

<https://www.jpl.nasa.gov/edu/teach/activity/mission-to-mars-unit/>

<https://spaceplace.nasa.gov/explore-mars/en/>

<https://www.nasa.gov/stem-content/exploration-then-and-now-nasa-and-jamestown-education-module/>

Make a Shoebox Fly - Nasa.gov

b. Technology

Use of technology will conform to the New Jersey Student Learning Standards.

Students shall use computers to complete research and for word processing.

Teachers shall use appropriate technology to enhance lessons.

Students shall use computers for independent practice of developing skills and as part of the writing process.

Students shall use computers for as part of their project development or presentation

Students can use digital cameras for filming.

c. Supplies/Materials

a variety of art project supplies/paper

Markers/watercolor pencils/paint

Printer

Cardboard

Dowels

Tape

Plastic bottles

PVC

Shoeboxes

CDs, wheels, other misc objects

d. Texts

e. Supplemental Reading

Supplemental readings and/or materials must be relevant and appropriate and related to the course content. Any supplemental readings/materials will be used with teacher discretion and/or supervisor/administrator approval.

8. Methodologies

Methods include but are not limited to:

- Cooperative learning
- Individual and group research
- Individual and group problem solving
- Inquiry
- Class discussion
- Brainstorming
- Critical Thinking
- Experimenting
- Short lecture

9. Suggested Activities

- Skill-building activities
- Exploring multiple intelligences
- Researching
- Public Speaking
- Silent sustained reading
- Shared Inquiry discussions
- Close textual analysis

10. Interdisciplinary Connections

The scope of materials for this Fly me to the Moon unit is broad and interdisciplinary. While rooted in STEM, designs can be (and normally are) constructed from real-world, local, and

personal perspectives. The individual tasks and projects present requirements and problems to the students that are interdisciplinary in nature (Math, Computer research, Public Speaking). Students are also encouraged in creativity as they prepare their designs. As a team activity, Fly me to the moon encourages individual responsibility and cooperation among team members.

11. Professional Development

As per the PDP/100 Hours statement: the teacher will continue to improve expertise through participation in a variety of professional development opportunities. Specialized professional development for teachers in the Gifted and Talented Department is offered through the Bergen County Consortium of Teachers of the Gifted (BCCTG) and the New Jersey Association for Gifted Children (NJAGC). Teacher will continue to read professional journals and books.

12. Curriculum Map

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, Students with 504 Plans, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<p>To the Moon and Beyond</p> <ul style="list-style-type: none"> ● Race to Space; and why we still try and get there ● What makes a planet ● Can we live elsewhere? <ul style="list-style-type: none"> ● To learn about space, space exploration and how humans need to adapt to be able to function in space. 	1-2 weeks	<p><i>For Support:</i></p> <ul style="list-style-type: none"> ● Scaffolding of materials and assignments ● Guidance from teacher and peers ● Group work ● Use of technology (speech to text) ● Information posted on google classroom for independent review <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> ● Enhanced expectations for written and final assignments 	RI.CR.5.1. RI.MF.5.6. RI.CT.5.8 SL.PE.5.1 SL.II.5.2 SL.PI.5.4 SL.UM.5.5 9.4.5.CT.1 9.4.5.TL.3 9.2.8.CAP.1 7 5-ESS1-2	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> ● Strategic Questioning ● Monitoring Student Work <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> ● Creation of a final mission patch

<p>Space Habitats? Curiosity goes hand in hand with imagination. Students brainstorm the environmental and cultural requirements for a community. Next, learners develop potential solutions and technologies to meet the identified community requirements.</p>	2 weeks	<p><i>For Support:</i></p> <ul style="list-style-type: none"> ● Scaffolding of materials and assignments ● Guidance from teacher and peers ● Group work ● Templates ● Use of technology (speech to text) ● Information posted on google classroom for independent review <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> ● Enhanced expectations for written and final assignments 	<p>RI.CR.5.1. RI.MF.5.6. RI.CT.5.8 SL.PE.5.1 SL.II.5.2 SL.PI.5.4 SL.UM.5.5 9.4.5.CT.1 9.4.5.TL.3 9.2.8.CAP.1 7 5-ESS1-2</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> ● Strategic Questioning ● Monitoring Student Work <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> ● Creation of a presentation/lesson
<p>Space STEM and Beyond Students will follow directions, criteria and constraints to build space themed STEM projects such as stomp rockets, gliders, rovers, balloon drops, strategy games, etc. Or Using NASA's Mission to Mars Unit: Over the course of these lessons, students will learn about and plan a mission to Mars. Students will apply their creativity and science and math knowledge to explore the Red Planet.</p>	4-5 weeks	<p><i>For Support:</i> Scaffolding of materials and assignments Guidance from teacher and peers Group work Templates of glider Use of technology (speech to text) Information posted on google classroom for independent review</p> <p><i>For Enhancement:</i> Enhanced expectations for written and final assignments</p>	<p>5-PS2-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 SL.PE.5.1 SL.II.5.2 SL.PI.5.4 SL.UM.5.5 9.4.5.CT.1 9.4.5.TL.3 9.2.8.CAP.17</p>	<p><i>Formative Assessment:</i> Strategic Questioning Monitoring Student Work</p> <p><i>Summative Assessment:</i> Creation of final projects (with testing of designs)</p>