


What Is the Project?


Whether or not a school district requires its students to complete Exit Projects, such as an 8th-grade Exit project to advance to the 9th grade, interdisciplinary projects can be a valuable learning experience to help prepare low-achieving students for substantive, content-based middle or high school work.

Typically, students work on projects over an extended period. This Project has been designed both to meet rigorous standards and fit into either an extended or a more condensed schedule. Classroom, Inc. Projects are clearly defined for students. The information and activities provided in them give students all they need to complete the Project within their allotted timeframe. For those classes with more time to spend on the Project, there are numerous opportunities to extend and widen its scope. All Projects require students to present their findings in written, graphic, and oral formats, and all include a detailed standards-aligned scoring rubric for each Project component.

Classroom, Inc. offers Projects in science and social studies. Students are expected to work through certain steps to complete their simulation-related Projects, and for each they are required to present their findings in three ways:

 a written piece

 a graphic representation

 an oral presentation

Why Is the Project Important?

The Project is a valuable learning experience for students as well as an excellent assessment opportunity for teachers. Students will demonstrate their grade-level content-area competencies by:

- gathering information from primary research sources
- analyzing the information they have obtained
- organizing their findings
- clearly communicating their findings in written, graphic, and oral formats
- applying new concepts to situations beyond the classroom

Teachers can assess how well students have mastered these competencies by using the rubrics provided on pp. iv–vi.

How Do I Support My Students?

Notes for Teachers

There are five types of notes for teachers in the annotated teacher's version of this Project: *Research Opportunities*, *Work It Through*, *Differentiated Instruction*, *Graphic Organizer Tip*, and *Take It Beyond*. These notes enable you to support students' comprehension of the Project reading material and help boost their overall performance on the Project.

How Do I Group My Students?

To complete the Project, students can work both individually *and* in their original groups, depending on the Project component they're working on. You may want to decide to what extent your students work alone or collectively, but to ensure that they are individually accountable for their performances, follow these suggestions:

Individual Work

- Have students individually complete all the written answers, note-taking, and active-reading prompts in the Gathering Information section.
- Students should also individually complete the double-entry journal in the Analyzing and Applying Information section.
- Students should individually prepare the graphic organizers presented in the Organizing Information section.

Group Work

- In their groups, students can research some of the components of their Project.
- If students do not complete the written piece individually, they can use the best ideas from the material they provided on pp. 17–18 to complete the written piece as a group.
- For the graphic representation, collaborative duties will depend on the assignment. For example, students can take turns entering information on a chart or graph, or each can provide a different picture for a photographic display.
- There are a variety of ways students might collaborate on the oral presentation. They might coach one another on public speaking tips, speak different parts in a script, or assign individual roles, such as delivering the presentation and providing music or sound effects.

What Resources Can My Students Use?

This Classroom, Inc. Project has been designed so that students have everything they need at their fingertips if other resources are not available. They do not need to go beyond the Projects in their Student Handbook to have a rich, content-area learning experience while meeting the standards requirements for completing the Project. The pages in the Gathering Information section are designed to expose students to a range of writing forms, e.g., interviews, letters, articles, research reports, and company publications, such as newsletters and press releases. **Note:** You may wish to point out to students that although the resources in Gathering Information sometimes present a fictional context—for example an interview with an imaginary character or a press release from a made-up company, all the facts cited in these pages are verifiable.

To further enhance students' experiences with the Project, both teachers and students are encouraged to utilize all relevant resources their schools and classrooms offer. On the Internet, students can gather additional content and data for their Projects. (Make sure to monitor students' independent work on the computer so that they use relevant content as research and do not directly incorporate the work of others into their own written piece.) Additionally, you can guide them to use school and classroom library books and articles. If possible, enrich students' experience by arranging a field trip to a museum or other organization that relates to the Project assignment.

How Do I Meet Individual Needs?

Some students in your classroom might be English language learners. Others might have special education needs, such as auditory or visual processing difficulties, dyslexia, or other learning difficulties. The teacher notes under the head *Differentiated Instruction* provide intervention strategies for working with these student populations.

Here are some links to further resources for meeting the needs of English language learners and Special Education students:

<http://www.webenglishteacher.com/esl.html>

A compendium of web links to resources for ELL teachers

<http://www.dyslexia-teacher.com>

Information and resources for helping students with dyslexia

<http://www.teachingld.org/default.cfm>

Information and resources for helping students with learning difficulties

How Do I Assess the Project?

To evaluate your students' standards-linked performance on the Science Project, you can use the criteria in the following rubric, which addresses the overall Project (scientific process and conceptual understanding) as well as its individual components (written piece, graphic representation, and oral presentation). Or you can use a district or school rubric for assessing written, graphic, or oral work.

Toward the beginning of the Project, familiarize students with the different sections of this rubric and discuss the Self-Assessment Checklist on p. 21. The list of criteria will help students understand what is expected of them in each area of their Project work.

Science Project Rubric

SCORE	Understanding Science Concepts and Skills	Evaluating Written Piece	Evaluating Graphic Representation	Evaluating Oral Presentation
4 Exceeds Expectations	<ul style="list-style-type: none"> ♦ Clearly understands and effectively uses key science concepts and vocabulary ♦ Clearly states a thesis ♦ Collects and analyzes an array of data ♦ Draws and explains a conclusion based on an analysis of the data ♦ Represents the concept in multiple ways 	<ul style="list-style-type: none"> ♦ Presents clear overall structure, using an identifiable organizing principle such as least-to-most-important facts or problem-solution ♦ Includes: excellent introduction with well-defined thesis statement, paragraphs with details and examples that well support the thesis statement, strong summarizing conclusion ♦ Accurately describes how conditions on the Moon affect the playing of a particular sport there, and provides ample scientific facts and examples related to the sport ♦ Uses research from multiple sources ♦ Identifies all sources of information ♦ Writes very clearly and has excellent grammar, punctuation, and spelling 	<ul style="list-style-type: none"> ♦ Creates a clear and accurate scale diagram of a field, court, or other sports playing area ♦ Includes a mathematically accurate key to the scale diagram ♦ Presents scale key in the correct format ♦ Bases scale numbers on an accurate or reasonable approximation of actual court or field size ♦ Diagram includes details and representations of players typical of chosen sport ♦ Makes the scale diagram neat, readable, and attractive ♦ Effectively integrates the graphic representation with the written piece or oral presentation to enhance project 	<ul style="list-style-type: none"> ♦ Effectively delivers an oral report of findings on a sport played on the moon ♦ Organizes all information in a logical way ♦ Provides many accurate scientific facts, examples, and details to support concepts/ideas ♦ Speaks clearly and demonstrates an excellent understanding of the English language ♦ Fully engages audience and answers questions accurately

SCORE	Understanding Science Concepts and Skills	Evaluating Written Piece	Evaluating Graphic Representation	Evaluating Oral Presentation
<p>3 Meets Expectations</p>	<ul style="list-style-type: none"> ◆ Understands and effectively uses key science concepts and vocabulary ◆ States a thesis ◆ Collects and analyzes data ◆ Draws and explains a conclusion ◆ Represents the concept in multiple ways 	<ul style="list-style-type: none"> ◆ Presents pretty clear overall structure, using an identifiable organizing principle such as least-to-most-important facts or problem-solution ◆ Includes: introduction that has a thesis statement, paragraphs related to the thesis statement, conclusion ◆ For the most part, accurately describes how conditions on the moon affect the playing of a particular sport there, and provides scientific facts and examples related to the sport ◆ Uses research from a few sources ◆ Identifies most of the sources of information ◆ Writes pretty clearly but makes some grammatical, punctuation, and spelling errors 	<ul style="list-style-type: none"> ◆ For the most part, creates a clear and accurate scale diagram of a field, court, or other sports playing area ◆ Includes a mathematically accurate key to the scale diagram ◆ Presents scale key close to the correct format ◆ Bases scale numbers on a reasonable approximation of actual court or field size ◆ Diagram includes one or two details or representations of players typical of chosen sport ◆ For the most part, makes the scale diagram neat, readable, and attractive ◆ Makes a good attempt at integrating the graphic representation with the written piece or oral presentation 	<ul style="list-style-type: none"> ◆ Delivers an oral report presenting findings on a sport played on the moon—but sometimes strays from format ◆ Generally organizes all information in a logical way ◆ For the most part, provides accurate scientific facts, examples, and details to support concepts/ideas ◆ Speaks clearly most of the time and demonstrates a good understanding of the English language ◆ Engages audience a good part of the time and for the most part answers questions accurately
<p>2 Approaches Expectations</p>	<ul style="list-style-type: none"> ◆ Understands and uses some key science concepts and vocabulary ◆ Includes a thesis but it is not clearly stated or thought out ◆ Collects only a few pieces of data and provides little analysis ◆ Draws a conclusion but does not state it clearly 	<ul style="list-style-type: none"> ◆ Presents only partially clear overall structure, which may or may not use an identifiable organizing principle such as least-to-most-important facts or problem-solution ◆ Does not include one of the following parts: introduction with thesis statement, paragraphs related to the thesis statement, conclusion 	<ul style="list-style-type: none"> ◆ Only partially creates a clear and accurate scale diagram of a field, court, or other sports playing area ◆ Includes key to the scale diagram, but it is not 100% accurate ◆ Presents scale key, but not in the correct format ◆ Bases scale numbers on a fair or poor approximation of actual court or field size 	<ul style="list-style-type: none"> ◆ Doesn't stick to the chosen format—presenting findings on a sport played on the moon—when delivering oral report ◆ Does not organize information in a logical way, making it difficult to understand key points ◆ Does not always provide accurate scientific facts, examples, and details to support concepts/ideas

PROJECT OVERVIEW

SCORE	Understanding Science Concepts and Skills	Evaluating Written Piece	Evaluating Graphic Representation	Evaluating Oral Presentation
	<ul style="list-style-type: none"> ◆ Represents the concept in only one way 	<ul style="list-style-type: none"> ◆ Only sometimes accurately describes how conditions on the moon affect the playing of a particular sport there, and provides too few scientific facts and examples related to the sport ◆ Uses research from just one source ◆ Identifies only one source of information ◆ Writes only fairly well and makes many grammatical, punctuation, and spelling errors 	<ul style="list-style-type: none"> ◆ Diagram includes one or no details typical of chosen sport ◆ Attempts to make the diagram neat, readable, and attractive are uneven ◆ In a limited way, integrates the graphic representation with the written piece or oral presentation 	<ul style="list-style-type: none"> ◆ Speaks clearly only part of the time and demonstrates only a fair understanding of the English language ◆ Does not successfully engage audience or respond accurately to questions
<p>1 Falls Below Expectations</p>	<ul style="list-style-type: none"> ◆ Does not demonstrate an understanding of key science concepts and vocabulary ◆ Does not include a thesis statement ◆ Does not collect data ◆ Does not draw a clear or logical conclusion ◆ Work is incomplete and unclear or inaccurate, and unsupported by research 	<ul style="list-style-type: none"> ◆ Presents a disorganized overall structure that does not use an identifiable organizing principle ◆ Does not include two of the following parts: introduction with thesis statement, paragraphs related to the thesis statement, conclusion ◆ Does not accurately describe how conditions on the moon affect the playing of a particular sport there, and provides no scientific facts or examples related to the sport ◆ Does not use any sources for research ◆ Writes poorly, making the report difficult to understand because of grammatical, punctuation, and spelling errors 	<ul style="list-style-type: none"> ◆ Does not create a clear and accurate scale diagram of a field, court, or other sports playing area ◆ Does not include a key to the scale diagram ◆ Does not base scale numbers on a reasonable approximation of actual court or field size ◆ Diagram includes no details or representations of players typical of chosen sport ◆ Creates diagram that is messy, unreadable, and unattractive ◆ Does not integrate the graphic representation with the written piece or oral presentation 	<ul style="list-style-type: none"> ◆ Uses wrong format, or incorrectly presents findings on a sport played on the moon ◆ Does not organize information in a logical way, making it impossible to follow any of the points ◆ Provides no scientific facts, examples, or details to support concepts/ideas ◆ Does not speak clearly and demonstrates a poor grasp of the English language ◆ Does not engage audience or respond to questions

Sports on the Moon

PROJECT ASSIGNMENT

You and Michael Lowery, your Director of Programming at The Sports Network, are in a private meeting, planning some new programs to launch next fall. All of a sudden you have a brainstorm—an idea that is literally out of this world! Why not broadcast a special that shows your viewers what it would be like to play a sport on the moon?

Together, you and your team will decide on the best sport to feature on “Sports on the Moon.” If played on the moon, a team sport such as baseball, basketball, or soccer would pose many interesting challenges for the players.

Research Question:

In what specific ways would playing a particular sport on the moon differ from playing that same sport on Earth?

Your project must include:



Written Piece: A research report

Your report will be based on the scientific information presented in the Gathering Information section of this booklet. It will include information on all the scientific concepts that would affect playing a sport on the moon, such as:

- gravity
- laws of motion
- lack of atmosphere
- topography
- principles of satellite communication

Your report should also include the rules of the sport and a description of any necessary equipment. It should be clearly written and have good grammar, punctuation, and spelling.



Graphic Representation: A scale diagram

Your scale diagram will be of the sports court or playing field your chosen sport is played on. Drawn to scale, it should show:

- the shape of the court or field
- its length, width, and height
- a key explaining the scale (such as 1 cm = 10 feet)
- a drawing of the stadium, field, or court with a representation of the players



Oral Presentation: An oral report summarizing findings

Present a report to the class on your findings. Your oral report should be based on a written script and should include:

- details about the scientific concepts involved in playing the sport on the moon
- science vocabulary

WORK IT THROUGH

To prepare students to do the calculations for a scale diagram, draw a diagram on the board. You might use as an example an Olympic-sized swimming pool, which is approximately 164 feet long by 82 feet wide. Tell students they want their diagrams to fit on an $8\frac{1}{2} \times 11$ sheet of paper. Model multiplying 164 by 12 to find the number of inches of the pool length (1,968), then divide by 11, the length of the paper (179 inches), and divide that by 12 to convert back to feet (14.92). Rounding up, the scale is $1'' = 15'$.

DIFFERENTIATED INSTRUCTION
English Language Learners

Before students begin this page, make sure they understand the sports of tennis, golf, and baseball. You may wish to have volunteers briefly explain the games and rules to the class.

Play Ball, Part 1:**Tennis, Baseball, and Golf on the Moon**

Imagine it's Sports Week on the moon. You get to watch a tennis match, a baseball game, and a golf tournament, all for free. On Monday, you'll go to Crater Court, on Tuesday, to Star Stadium, and on Wednesday, to Grassless Golf Course. You'll see how the moon's conditions specifically affect each sport.

Monday at Crater Court You take your seat, tying yourself down to prevent bouncing from the lack of gravity. You notice that the tennis court is situated in the middle of the crater. The walls around it, above which the spectators sit, are high, and the ground is flat. Still, it's chaos on the court! It's a final match between two star players, but they're not used to playing on the moon. Every serve shoots beyond the court to the crater wall. When a ball is lobbed, it doesn't go up in a curve as it's supposed to. And low ground shots actually go over the players' heads. You're beginning to see why all the Sports Week events are free of charge.

Tuesday at Star Stadium At home on Earth, the baseball team now wearing the blue spacesuits has the lowest ranking in the professional American league. Last season they lost three-quarters of their games. But on the moon, they're great! Even the worst batter manages to hit the ball 900 feet (385 feet is average on Earth), and the ball stays in the air for 30 seconds (5 seconds is average on Earth). When a really good batter comes up to the plate, he hits the ball, rounds the bases, then watches from home plate as his ball clears the stadium wall. Where's the challenge?

Wednesday at Grassless Golf Course In real life, astronaut Alan Shepard hit two golf balls on the moon. Each drive, he estimated, went 200 to 400 yards. You can believe it, because the players in this tournament are hitting incredible long shots. But the game is going *so* slowly. The balls keep getting trapped in craters, which are a real hazard for moon golfers. Chipping the balls out of the crater so the game can continue seems to take forever. Yawn.



GRAPHIC Later, you'll be creating a scale diagram of a sports court or field on the moon. A scale tells how the actual measure of an object compares to an enlarged or, in this case, reduced representation of the object. You want the measurements on your scale to be realistic. For example, if your paper is $8\frac{1}{2}$ inches wide by 11 inches long and you want to fill it with a scale diagram of a standard-sized tennis court, which is 60 feet wide by 120 feet long, what scale would you use? Circle one, and explain your answer in the space provided.

1 inch = 2.1 feet **1 inch = 10.9 feet** 1 inch = .120 feet

I converted 120 ft., the longest court dimension, into in. (1,440), then divided by 11, the length of my paper, to get 131 in. I divided 131 in. by 12, the number of inches in a foot, and got 10.9. So 1 inch = 10.9 feet on my scale diagram.

Play Ball, Part 2: Basketball and Soccer on the Moon

Sports Week on the moon is not over. Read on!

Thursday at Crater Court You're excited to see this WNBA game because basketball involves a lot of jumping, and high jumps are what gravity on the moon is all about. The hoop height at Crater Court is 30 feet, equivalent to the 10-foot hoops at home. Today, New York Liberty is playing North Carolina's Charlotte Sting. A Charlotte Sting player has the ball. She jumps 24 feet in the air to dunk it. Two points for Sting! Liberty gets the ball on the rebound, but a Sting player is guarding her so tight, despite how they're both bouncing around, that she can't get loose. Taking a chance, she shoots. *Swish!* From fully across the court she easily nets the ball. Three points for Liberty! But when the players try to dribble the ball, it bounces beyond their reach. As long as there's dribbling in basketball, there'll never be basketball on the moon.

Friday at Forces Field The moon's gravity, combined with the way Newton's three Laws of Motion work on the moon, is not kind to soccer. After all, soccer's played with the feet, and even on Earth people can't exercise as much control with their feet as they can with their hands. So the ball is constantly fumbled and bouncing all over the place. A small bounce on Earth is a soaring one on the moon. The ball is almost never on the ground, so how can anyone kick it to get a goal? And how can anyone get a goal anyway, since the goalkeeper can block a wider range by just jumping up and grabbing the flying ball? The only way this game has a chance on the moon is if the players give the ball the lightest possible tap with their feet. And it's hard to imagine a thrilling, heart-stopping play that starts with a tiny tap.

WORK IT THROUGH

For the articles on pages 8 and 9, use Think-Pair-Share by first having students summarize the reading on their own, and then partner to discuss the reading. Last, have pairs share their summaries and analyses with the class.



ORAL The tone in the previous two articles is lighthearted and informal.

To present a formal summary of your findings to the class, you would change the tone, eliminating humor, casual language, and the reference to your audience as *you*. Write an introduction for a formal report by completing the sentence below and adding a second sentence of your own:

Playing basketball on the Moon is very different than playing it on Earth because *Sentences will vary, but should be complete and formal in tone.*
