

# STEM

## Project Based Learning Activities



STEM PBL activities are available as a resource through Custom Course Builder or Flex Assignments.

Activity	Essential Questions	Project Goals	Overview	Primary Course Alignment
Algal Blooms	How do we make predictions for location and timing of future algae blooms and ensure that our predictions have validity?	Use satellite data to determine the correlation between sea surface temperature, sunlight, and the amount of chlorophyll (phytoplankton) in the Gulf of Maine at various times of year.	Students will assume the role of an environmental scientist attempting to predict future red tide outbreaks. They will use real-world satellite data from NASA to analyze chlorophyll concentrations, create a proposal for the government explaining where blooms are most likely to occur in the coastal United States, and what can be done to reduce these blooms.	Biology
Habitat and Adaptation	How can we help become more aware of natural habitats?	<p>Explain the effect of environmental changes on the selection of desired traits in a population.</p> <p>Explain how genetic variation, natural selection, and environment lead to adaptations in organisms.</p> <p>Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p>	Students assume the role of park naturalists who plan to develop a summer program for local residents in which they learn about their park's various habitats and species. To generate public interest, students create a brochure that highlights two habitats in their selected park.	Biology

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Business: Revenue vs. Cost	How can businesses efficiently produce and sell quality products?	<p>Solve systems of linear equations using algebraic and graphical methods.</p> <p>Create and solve systems of linear equations relating to business.</p>	Assuming the role of a small business owner, students come up with an idea for a product they want to produce & sell. Students research & determine the cost of producing their product, create a two-variable equation for cost, & analyze their system of equations graphically by highlighting areas of revenue loss & gain, as well as the break-even point.	Algebra 1A
Space Science: Become a Martian!	How would humans go about choosing another planet to inhabit and how would they plan for colonization on the chosen planet?	<p>Define the scientific challenges of colonizing a new planet (e.g., atmosphere, food, impact of gravity).</p> <p>Conduct and organize research and produce a quality solution proposal for colonization of the new planet.</p>	Students assume the role of space scientist to inform amateur space-science enthusiasts regarding the theoretical colonization of Mars. Based on research, students will choose one potential challenge of colonizing Mars and propose solutions to overcoming the challenge.	High School Earth and Space Science
Technical Writing: How Do I...?	How can a complex process be explained in simple terms?	<p>Write an informational text about a technical process.</p> <p>Learn how to apply knowledge of circuitry to create a technical manual that involves a circuit.</p>	Students assume the role of technical writer to create a how-to manual for making a device that involves an electrical circuit (such as a flashlight). Students write clear, step-by-step instructions for how to build the device, including relevant safety cautions.	Physics B
Population Boom: City Invasion!	How can statistical reports be used to solve long-term problems?	<p>Analyze a statistical report to address population growth issues.</p> <p>Apply supply and demand principles in addressing population growth and housing costs.</p>	Students assume the role of city planner. Students research reports with statistics on housing costs, housing availability, and population trends for a growing U.S. city. Students use statistics assess the region's ability to withstand population growth, propose solutions to accommodate population increase, and reduce homelessness due to rent increases.	Algebra 2B

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Waste Management	How can exponential models be used to identify and solve problems involving earth's resources?	<p>Recognize the impact of human activity on earth and its resources.</p> <p>Use exponential decay graphs and models to explain and solve problems.</p>	Students assume the role of a waste management specialist preparing a lecture for a manufacturer's conference on earth-friendly product design. They prepare a presentation on common items, their annual consumption quantity, chemical structure, half-life (with decay graphs and model), and environmental effects. Students will recommend alternative materials.	Algebra 1A
Asthma Awareness - Breathing Easier	How can statistics and data about asthma be conveyed accurately and in a way that is interesting to a community audience?	<p>Develop a model to demonstrate how asthma affects airflow and disrupts homeostasis in the body.</p> <p>Analyze data related to asthma prevalence.</p> <p>Write a clear and factual presentation appropriate for the audience.</p> <p>Use PowerPoint or other presentation software to convey information.</p>	Students assume the role of a community health educator preparing a presentation about asthma for community members. The presentation will demonstrate how asthma affects airflow and the body's systems. The presentation includes an analysis of asthma prevalence locally compared to nationally, and trends in asthma prevalence over time (using graphs and tables).	Biology A (respiratory system)
Invasive Pythons	How can information about a specific invasive species problem, and possible solutions to this problem, be conveyed using data and text?	Gather and assess information and statistics about the invasive Burmese pythons in the Florida Everglades. Research and evaluate some solutions currently being considered for this problem. Synthesize the information and develop an informative article to share with readers.	Students assume the role of an investigative reporter preparing an article on invasive pythons in the Florida Everglades. The article must include data and statics about the python population and the population trends of the python's prey, as well as the geographical spread of the python population. It should include an evaluation of several proposed solutions to the problem of invasive pythons and include maps, graphs and charts to convey trends in data, and be prepared using word processing software.	Biology, Semester B

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Technology Tales	How can the relationship between science and cell phone technology be conveyed to younger students?	Gather information to develop a deep understanding of the relationship between the science of wave behavior and cell phone technology. Consider how this information could be conveyed to an audience of grade 4 and 5 students. Produce an age-appropriate, scientifically accurate, and appealing book using word processing software.	Students assume the role of a children's book author to explain the science of wave behavior involved in cell phone technology in an accessible way. Students will gather information about how cell phones use waves to transmit information. They will synthesize their understanding of how the technology of cell phones is based on the science of wave behavior in a fun, age appropriate book with visuals.	Physics, Semester B
Paper or Plastic?	How can the optimal solution for carrying groceries and other purchases be determined based on a variety of factors?	Develop and administer a survey about customer perspectives on paper/ plastic/reusable grocery bags, compile and analyze the collected data, and make a spreadsheet of the results. Carry out research into the environmental impact and cost of each type of bag. Synthesize the results of the survey and research to prepare a recommendation for corporate executives about which bag type would be best.	Students assume the role of an executive in a grocery store chain and will examine the issue of paper, plastic, and reusable bags in terms of environmental impact, cost and consumer appeal. They will conduct a survey to determine customer opinion and research environmental impacts and costs. Students will prepare a report to "management" summarizing their findings, including a spreadsheet of their survey results, and recommend which type of bags should be offered at the grocery store chain.	High School Earth and Space Science Semester B
Document the Evidence	How can data about trends in atmospheric CO <sub>2</sub> levels be analyzed, synthesized, and communicated?	Gather and analyze data about atmospheric CO <sub>2</sub> levels, synthesize the data with knowledge of the impacts of increasing CO <sub>2</sub> levels on earth's environment, and present their research in the form of a short documentary film.	Students assume the role of a documentary filmmaker, preparing to make a short film about levels of atmospheric carbon dioxide over time. They will research global climate change, its connection to atmospheric CO <sub>2</sub> , its impact on Earth's environment, and actions that can halt or reverse increasing CO <sub>2</sub> levels. This information will be synthesized into a script and short film.	High School Earth and Space Science, Semester B

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Sand Dune Savvy	How can information about the importance and preservation of sand dunes be conveyed to an audience that might not have a background in science or an understanding of the importance of dunes?	Gather information about the importance of sand dunes in coastal ecosystems for both living things and erosion control. Find information about various technologies that can be used to help stabilize and preserve sand dunes.	Students assume the role of the tourism manager for a coastal town, preparing a website to inform out-of-town visitors of the importance of dunes for erosion control, storm protection, and local wildlife, introducing tourists to some of the technologies in place to help stabilize dunes, and providing visitors with a list of strategies for minimizing their impact on the sand dunes.	High School Earth and Space Semester B
Graphs on the Go!	How can measurements of an individual's motion be represented mathematically?	Students will brainstorm how an app could be used to show runners, bikers, and walkers graphical summaries of their workouts including distance vs time, velocity, acceleration etc., as well as their levels of kinetic energy. They will plan and create a mockup of the app by listing the features the app will offer and the information the app will need to gather, and the mathematical formulas that can be used to create the graphs.	Students assume the role of an app developer to plan a mobile app that could be used to provide motion graphs showing runners, bikers, and walkers graphical summaries of their workouts and levels of kinetic energy.	Physics Semester A

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