

# STEM 9:

## Eco-Business Project Overview

<b>Driving Questions</b>	<p>How can we create a product that will solve/mitigate an environmental injustice?</p> <ul style="list-style-type: none"> <li>● How do human actions impact the environment and how does this impact, in turn, affect our communities?</li> <li>● How can we justify the importance of our Eco-Business to investors using research and data supported claims?</li> <li>● How can we estimate and display the cost and revenue of our business to potential investors?</li> <li>● How can we create a product name design using equations?</li> <li>● How can we effectively communicate our plans and ideas to fund our vision?</li> </ul>
<b>Project Summary</b>	<p>This project based learning unit strengthens students' scientific and mathematical skills by tasking them to collaboratively develop a product that addresses, mitigates, and/or solves a contemporary environmental issue. Along this process, students develop an understanding of environmental (in)justices, use graphs to visually summarize data, project budgeting expenses via functions, graph their product name using functions, domain, and range and summarize their collective work into a succinct pitch to potential investors.</p> <p><b>Chapter 1: Investigation into Environmental Injustices</b></p> <ul style="list-style-type: none"> <li>● Students develop an understanding of environmental (in)justices.</li> <li>● <b>Driving Question:</b> How do human actions impact the environment and how does this impact, in turn, affect our communities?</li> <li>● <b>Design Process Steps:</b> Identify, Investigate</li> </ul> <p><b>Chapter 2: Market Research</b></p> <ul style="list-style-type: none"> <li>● Students conduct research on an environmental issue through online research and peer research then come up with a product that solves or mitigates a specific issue of their choice.</li> <li>● <b>Driving Question:</b> How can we justify the importance of our Eco-Business to investors using research and data supported claims?</li> <li>● <b>Design Process Steps:</b> Identify, Investigate, Imagine</li> </ul> <p><b>Chapter 3: Financial Plan</b></p> <ul style="list-style-type: none"> <li>● Students develop an Eco-Business by applying concepts from functions to create a financial plan.</li> <li>● <b>Driving Question:</b> How can we estimate and display the cost and revenue of our business to potential investors?</li> <li>● <b>Design Process Steps:</b> Investigate, Imagine, Design</li> </ul> <p><b>Chapter 4: Product Name</b></p> <ul style="list-style-type: none"> <li>● Students graph their product name using functions, domain, and range.</li> <li>● <b>Driving Question:</b> How can we create a product name design using equations?</li> <li>● <b>Design Process Steps:</b> Design, Create, Test</li> </ul> <p><b>Chapter 5: Eco-Business Pitch</b></p> <ul style="list-style-type: none"> <li>● Students summarize their work into a succinct pitch to potential investors in order to seek funding for their vision.</li> <li>● <b>Driving Question:</b> How can we effectively communicate our plans and ideas to fund our vision?</li> <li>● <b>Design Process Steps:</b> Reiterate, Share</li> </ul>

**Core  
Academic  
Content**

Next Generation Science Standards

**HS-ESS3-4:** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

**HS-ESS3-1:** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes have influenced human activity.

**HS-LS2-2:** Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

**HS-LS2-6:** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-7:** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

**HS-ETS1-1:** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Common Core State Standards – Math

**8.EE.C.7:** Solve linear equations in one variable.

**8.EE.C.8:** Analyze and solve pairs of simultaneous linear equations.

**8.F.A.2:** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

**8.F.A.3:** Interpret the equation  $y = mx + b$  as defining a linear function, whose graph is a straight line.

**8.F.B.4:** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two  $(x, y)$  values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

**HSA.CED.A.2:** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

	<p><b>HSF.IF.A.1:</b> Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.</p> <p><b>HSF.IF.B.4:</b> For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.</p> <p><b>HSF.IF.C.7:</b> Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.</p> <p><b>HSF.BF.A.1:</b> Write a function that describes a relationship between two quantities.</p>
<p><b>Deeper Learning Success Skills</b></p>	<p><b>Think critically and solve complex problems</b></p> <ul style="list-style-type: none"> <li>● Describe a complex question, problem or issue</li> <li>● Adjust and try something different when their approach is not working</li> <li>● Support their hypothesis, position, or claim with substantial evidence and logical reasoning</li> </ul> <p><b>Work collaboratively</b></p> <ul style="list-style-type: none"> <li>● Contribute relevant knowledge, skills, and ideas to others involved in the work</li> <li>● Seek and build on a range of ideas from others</li> <li>● Work with others on an action plan that has specific goals</li> <li>● Identify and explain each group member’s role and responsibilities in shared work</li> <li>● Work productively with others toward shared goals, doing their individual parts</li> </ul> <p><b>Communicate effectively</b></p> <ul style="list-style-type: none"> <li>● Identify their target audience and their relevant characteristics</li> <li>● Make their message clear, accessible, and useful to their audience</li> <li>● Use a variety of media, including writing and speaking, to communicate with an audience</li> <li>● Listen and actively attend to the verbal and nonverbal communications of others</li> <li>● Offer respectful, specific, and helpful feedback to others</li> </ul> <p><b>Learn How to learn and Develop Academic Mindsets</b></p> <ul style="list-style-type: none"> <li>● Identify the future relevance and value of the work that they take on</li> <li>● Take initiative in the direction and management of their work</li> <li>● Put effort into their work and persist despite difficulties</li> <li>● Treat mistakes as opportunities to learn</li> <li>● Revise as needed to make high-quality work</li> <li>● Use reflection on their work to learn and grow</li> </ul>

<b>Products</b>	Team: <ul style="list-style-type: none"> <li>● Eco-Business Poster</li> <li>● Eco-Business Pitch and Presentation to Investors</li> </ul>	Individual: <ul style="list-style-type: none"> <li>● STEM 9 WS Packet</li> </ul>
<b>Making Products Public (Exhibitions + Expert critiques)</b>	<p>Consider inviting Aim High Community Members (Site Directors and other teachers, Central Office staff, Board members, parents) as visiting investors.</p> <p>During celebration day, exhibit eco-business teams' posters. They could even continue to pitch their products and guests can decide which ones they would fund. Recordings of business pitches could also be shown.</p>	
<b>Reflection Methods</b>	<p>Throughout each chapter, students will reflect on the progressive development of their eco-business ideas and the relevance of the content to them and their community.</p> <p>Several moments of group reflection are built in to help teams assess, evaluate, and plan their teamwork strategies, leadership skills, and specific needs to be successful collaborators.</p> <p>At the end, students will receive feedback from peers and a completed rubric from the teacher to evaluate their growth and learning.</p>	

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