



Elective Department
Grade 6 Curriculum

Engineering Explorations

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Effective Date: Fall 2026

Unit 1
Key Concepts to Cover
Measurement - Basics of measuring using rules and/or tape measures - Learn how to properly use and apply measurement for future projects Engineering Design Process - Understand computational thinking and computer programming as tools used in design and engineering. - How to solve problems while applying the design process. Robotics - Programming and coding - Focus on moving, turning, sensing the environment, contact, and proximity. Building Projects - Apply the above concepts, measurement and EDP to create various projects to test load and force.
Recommended Pacing
1 Marking Period / 8 Weeks
Summary & Rationale
Engineering Explorations is designed to introduce students to build an appreciation for the role of technology in everyday life, society, and the environment. Throughout the course, students will explore a wide range of topics, including programming, robotics, measurement, and building and design technology.

Students are introduced to coding concepts and programming languages as they create interactive projects. They will work with robotic components, gaining hands-on experience with robotics and engineering principles.

This course emphasizes problem-solving, critical thinking, and creativity through engaging, hands-on activities. Students collaborate in teams to tackle real-world challenges while developing essential 21st-century skills such as communication, collaboration, and innovation.

Standards

Engineering Design

8.2.8.ED.1	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.ED.3	Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ED.5	Explain the need for optimization in a design process.
8.2.8.ED.6	Analyze how trade-offs can impact the design of a product.
8.2.8.ED.7	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).

Computing Systems

8.1.8.CS.4	Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.
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Impacts of Computing

8.1.8.IC.1	Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.
8.1.8.IC.2	Describe issues of bias and accessibility in the design of existing technologies.

Interaction of Technology and Human

8.2.8.ITH.1	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
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Algorithms & Programming

8.1.8.AP.1	Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.
8.1.8.AP.3	Differentiate among various savings tools and how to use them most effectively.
8.1.8.AP.4	Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
8.1.8.AP.5	Create procedures with parameters to organize code and make it easier to reuse.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
8.1.8.AP.7	Design programs, incorporating existing code, media, and libraries, and give attribution.
8.1.8.AP.8	Systematically test and refine programs using a range of test cases and users.
Ethics & Culture	
8.2.8.EC.1	Explain ethical issues that may arise from the use of new technologies.
Digital Citizenship	
9.4.8.DC.3	Describe tradeoffs between allowing information to be public (e.g., within online games) versus keeping information private and secure.
9.4.8.DC.4	Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.
9.4.8.DC.5	Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.
Career Readiness, Life Literacies, & Key Skills	
9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
9.2.8.CAP.10	Evaluate how careers have evolved regionally, nationally, and globally.
Creativity and Innovation	
9.4.8.CI.2	Evaluate how careers have evolved regionally, nationally, and globally.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
Critical Thinking & Problem Solving	
9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).

9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.				
Interdisciplinary Connections					
Science					
MS-EST1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.				
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.				
MS-EST1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool or process such that an optimal design can be achieved				
<table border="1"> <tr> <th>Enduring Understandings:</th><th>Essential Questions:</th></tr> <tr> <td> - Precise measuring allows all people to interpret data correctly. - The Engineering Design Process is a guideline to help engineers create or improve products as a solution to any problem. - By working through the design process, students become researchers and innovators who are technologically literate in today's society. - The design process requires workers to constantly improve on products and solutions that may already exist through the process of researching, testing, designing, and building. It is this method that allows current ideas and products to be improved upon and new innovations to be developed. - Creativity, innovation, critical thinking, problem solving, communication and collaboration are valuable skills when working with others to achieve a common goal. Combining these skills in </td><td> - How can the Engineering Design Process help us outside of engineering? - How can failure produce positive outcomes? - How can we communicate ideas through the use of design? - Why are teams of people more successful than an individual when solving problems? - How can we apply the steps of the Engineering Design Process to solve a real world problem? - How are algorithms used in coding? - What computational devices do people use in their everyday life? - What are the basics of computer programming? - How does the design process allow us to become more technologically literate? - What 21st Century Skills are required for success in engineering and design? </td></tr> </table>		Enduring Understandings:	Essential Questions:	- Precise measuring allows all people to interpret data correctly. - The Engineering Design Process is a guideline to help engineers create or improve products as a solution to any problem. - By working through the design process, students become researchers and innovators who are technologically literate in today's society. - The design process requires workers to constantly improve on products and solutions that may already exist through the process of researching, testing, designing, and building. It is this method that allows current ideas and products to be improved upon and new innovations to be developed. - Creativity, innovation, critical thinking, problem solving, communication and collaboration are valuable skills when working with others to achieve a common goal. Combining these skills in	- How can the Engineering Design Process help us outside of engineering? - How can failure produce positive outcomes? - How can we communicate ideas through the use of design? - Why are teams of people more successful than an individual when solving problems? - How can we apply the steps of the Engineering Design Process to solve a real world problem? - How are algorithms used in coding? - What computational devices do people use in their everyday life? - What are the basics of computer programming? - How does the design process allow us to become more technologically literate? - What 21st Century Skills are required for success in engineering and design?
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a product driven environment extends the learning. • The Engineering Design Process can be used to help us solve everyday problems.	(teamwork, collaboration, trial & error, innovation, etc.) • What steps are involved in designing and building a product?
Suggested Resources/Technology Tools	
• sphero.com • sciencebuddies.org • Technology shared Google drive resources • Sphero Bolt+ Kit	
Evaluation and Grading	
Student progress is assessed through class participation, hands-on projects, homework assignments, quizzes, and tests.	
Tier 1 Modifications and Accommodations <i>Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans</i>	
Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to: • Follow individual IEP/504 plans for specific modifications. • Preferential seating • Extended/Additional time for assessments • Behavior management support • Assignments/resources in electronic and physical format • Break down assignments with oral directions, written directions, and visuals. • Provide frequent reminders to stay on task and reinforce on-task behavior • Work on organizational skills • Provide visual supports • Partnering/Grouping of students • Re-teaching and review • Multi-media approach to accommodate various learning styles • Decrease/Modify number of project requirements • Teacher/Aide/Para assistance • Demonstrations of techniques on an individual level • Show slide presentations to encourage exploration of project ideas MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to: • Allow the use of Google Translate where appropriate. • Provide alternate ways for the student to respond (verbal/pictographic answers instead of written) • Substitute a hands-on activity or use of different media in projects for a written activity • Prepare and distribute advance notes • Provide model sentence frames and sentence starters for both oral responses and written responses	

- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

Career Readiness, Life Literacies, and Key Skills NJSLs

- ☐ Act as a responsible and contributing citizen and employee.
- ☐ Apply appropriate academic and technical skills.
- ☐ Communicate clearly and effectively and with reason.
- ☐ Consider the environmental, social and economic impacts of decisions.
- ☐ Demonstrate creativity and innovation.
- ☐ Employ valid and reliable research strategies.
- ☐ Utilize critical thinking to make sense of problems and persevere in solving them.
- ☐ Model integrity, ethical leadership, and effective management.
- ☐ Plan education and career paths aligned to personal goals.
- ☐ Use technology to enhance productivity.
- ☐ Work productively in teams while using cultural global competence.