



Grade 5 STEAM Unit 3 - Problem Solvers at Work: Engineering Meets the Environment

Unit Focus

In this engaging STEAM unit, fifth graders will step into the roles of engineers, scientists, and problem-solvers as they design creative solutions to real-world challenges. Using LEGO Education Spike and Lego Education Science kits, students will build and test prototypes such as a Trash Monster Machine, a Winning Goal, and a Literary Randomizer. They will apply the engineering design process to invent classroom creations, tackle a performance-based task, and create models to explore how energy flows through food chains and how matter cycles among plants, animals, and decomposers. Students will also take on a MakerSpace challenge where they brainstorm and design inventions to address pressing environmental issues like plastic pollution, food waste, or biodiversity loss.

Throughout the unit, students will develop their engineering and design skills as they identify problems, brainstorm solutions, and refine prototypes. They will strengthen problem-solving skills by working within constraints, improving on others' ideas, and evaluating solutions using clear success criteria. By connecting scientific concepts to real-world issues, students will see how innovation can make a difference in their communities and beyond. The unit concludes with a digital literacy lesson on clickbait, where students learn to recognize and avoid misleading online content, building their capacity to be thoughtful, responsible digital citizens.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core English Language Arts: 5 - 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. (CCSS.ELA-LITERACY.SL.5.1) Next Generation Science Standards Performance Expectations: 5 - Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1) - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1) - 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-ETS1-1) - 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-ETS1-2)	<i>Students will be able to independently use their learning to...</i> T1 Ask questions to gain understanding, communicate their ideas, explain their thinking process, and evaluate efficiency or connectedness to a concept. T2 Work collaboratively and contribute constructively to project teams with a broader or global perspective. T3 Use the engineering design process to invent or innovate solutions. T4 Leverage technology to demonstrate learning competencies. T5 Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Problem solvers make sense of tasks by asking questions, breaking challenges into smaller parts, and trying out solutions to evaluate results. U2 Effective problem solvers adapt their strategies, recognize multiple solutions, and persevere through challenges, building resilience along the way. U3 Problem solvers use the design process, feedback, and technology to develop, test, and refine solutions.	<i>Students will keep considering...</i> Q1 How can I better understand a problem or task? Q2 What strategies help problem solvers get started, keep going when they're stuck, and persevere through challenges? Q3 How might a design relate to a scientific concept or pattern? Q4 How can I use what I know to develop and test a design?

Stage 1: Desired Results - Key Understandings

- 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. (3-5-ETS1-3)

CSTA: Computer Science Standards (2017)

3-5

- Create programs that include sequences, events, loops, and conditionals. (1B-AP-10)
- Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process. (1B-AP-11)
- Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences. (1B-AP-13)

ISTE Standards (2024)

ISTE Standards (2024): K-12

- Demonstrate empathetic, inclusive interactions online and use technology to responsibly contribute to their communities. (1.2.b.)
- Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (1.4.a.)
- Develop, test and refine prototypes as part of a cyclical design process. (1.4.c.)
- Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. (1.4.d.)
- Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (1.5.d.)

Madison Public Schools Profile of a Graduate

- Design: Engaging in a process to refine a product for an intended audience and purpose. (POG.2.2)
- Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)

U4 Scientific concepts and patterns inspire technological designs and solutions.
U5 Effective collaborators share and respect ideas while adjusting their thinking based on others' contributions.
U6 Technological methods can be used to develop and test solutions.

Q5 What makes someone an effective group member, and how can groups work together toward a common goal?
Q6 How does using technology help to accomplish a goal?

Acquisition of Knowledge and Skill

Knowledge

Students will know...

K1 There are often many ways to solve the same problem with code using loop, sequences, events, and conditionals.
K2 All engineering problems include criteria (what the solution must do) and constraints (limitations like materials, time, or cost)
K3 A failure point is where a design doesn't perform as expected or breaks
K4 Not all solutions are equal—some meet the criteria and constraints better than others.
K5 Collaborative discussions are rooted in shared responsibility of a task
K6 To build on others' ideas means to listen carefully and respond thoughtfully
K7 A design process is a structured method for solving problems and creating solutions
K8 Innovation improves through trial and error and iteration
K9 Solving creative or real-world problems often requires flexibility, patience, and resilience
K10 Energy in animal food was once energy from the sun.
K11 A system can be described by referring to how its components interact. (ex: energy transfer, movement of matter, etc.)

Skill(s)

Students will be skilled at...

S1 Identifying failure points of a model or program in order to make improvements
S2 Comparing and contrasting different solutions to determine which one meets the specified need
S3 Identifying criteria for success to evaluate a solution
S4 Engaging effectively in a range of collaborative discussions
S5 Building on others' ideas by agreeing, adding details, or offering respectful counterpoints
S6 Testing solutions or theories through prototyping or modeling
S7 Revising and improving their design based on results or performance
S8 Adapting to uncertainty in the problem-solving or design process.
S9 Simplifies problem-solving into a series of smaller tasks as a strategy to persevere through a challenge
S10 Knowing how to protect personal information and avoid risky behavior.
S11 Creates models to show scientific systems