



Grade 2 STEAM Unit 2 - From Bridges to Ferris Wheels: Hands-On STEAM Adventures

Unit Focus

In this STEAM unit, students engage in hands-on, collaborative learning to explore different materials, while evaluating their effectiveness. Using LEGO Education Spike and LEGO Education Science, along with MakerSpace materials, students tackle real-world problems and develop solutions through creativity, experimentation, and teamwork.

Students begin by investigating how different materials behave, testing their properties, and building simple machines and structures such as bridges. They gradually apply these skills to more complex challenges, including creating spinning rides, Ferris wheels, and amusement park attractions. Throughout the unit, students learn to plan, test, and refine prototypes while observing how materials and designs affect performance.

In the MakerSpace activities, students expand their problem-solving skills and use the engineering and design process to design an ice-insulating container and build a wind-powered boat. Throughout the unit, students develop critical skills such as collaboration, communication, perseverance, and creative problem-solving. They are encouraged to share ideas, give and receive feedback, and reflect on their learning.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core English Language Arts: 2 - Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (CCSS.ELA-LITERACY.SL.2.2) Mathematics: 2 - Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. (CCSS.MATH.CONTENT.2.G.A.3) Next Generation Science Standards Performance Expectations: 2 - Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (2-PS1-1) - Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. (2-PS1-2) - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	<i>Students will be able to independently use their learning to...</i> T1 Use the engineering design process to invent or innovate solutions T2 Ask questions to gain understanding, communicate their ideas, explain their thinking process, and evaluate efficiency or connectedness to a concept. T3 Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems. T4 Students leverage technology to demonstrate learning competencies.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Effective communicators ask questions, reread for information, or think about how this problem is similar to something else I have done. U2 Effective communicators share ideas with reasoning or evidence, explain decisions, and relate results to outcomes. U3 Engineers utilize the engineering design process to solve problems and develop new ideas.	<i>Students will keep considering...</i> Q1 How can I better understand a problem or task, and get started when it seems too big? Q2 Why is it important to persevere through challenges, and what makes an effective problem solver? Q3 How do effective group members contribute, work toward a common goal, and clearly communicate their ideas, thought process, and results?

Stage 1: Desired Results - Key Understandings

- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. (K-2-ETS1-3)

CSTA: Computer Science Standards (2017)

K-2

- Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks. (1A-AP-08)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)

ISTE Standards (2024)

ISTE Standards (2024): K-12

- 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.)

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 Problem solvers understand that there can be more than one solution to a problem.
U5 Problem solvers use strategies to understand tasks, break challenges into smaller parts, try solutions, and evaluate results.
U6 Technological methods can be used to develop and test solutions.
U7 Persevering through challenges builds one's growth mindset and builds resilience.

Q4 How do I develop and test a design, and how can technology help accomplish a goal?

Acquisition of Knowledge and Skill

Knowledge

Students will know...

K1 Different properties are suited for different purposes.
K2 Step-by-Step instructions can help one complete a task.
K3 Algorithms or programs can sometimes have errors and will need to be fixed.
K4 A situation that people want to change or create can be approached as a problem to be solved through engineering.
K5 Asking questions, making observations, and gathering information are helpful in thinking about problems.
K6 Before beginning to design a solution, it is important to clearly understand the problem.
K7 Because there is always more than one possible solution to a problem, it is useful to compare and test designs.
K8 The engineering design process is a series of steps used to solve a problem.
K9 Some problems can be ambiguous, making them more difficult to solve than others.
K10 Perseverance is having a continued effort in the face of obstacles.
K11 A circle can be partitioned into fractions.

Skill(s)

Students will be skilled at...

S1 Planning and conducting ways to test different materials in prototypes.
S2 Analyzing how the properties of the materials impact the effectiveness of a product.
S3 Evaluating the effectiveness of different designs.
S4 Building prototypes using the engineering and design process.
S5 Modifying a solution while considering a specific goal or outcome.
S6 Refining and improving the prototype.
S7 Persevering through challenging tasks and problems, revisiting the steps of the design process as many times as needed.
S8 Writing an algorithm for a daily process or routine.
S9 Identifying and fixing errors in an algorithm or program.
S10 Comparing and testing different designs that address the same problem to examine performance.
S11 Describing the key ideas from a story.
S12 Partitioning a circle into equal parts.