



Grade 5 STEAM Unit 2 - Investigating Energy, Gravity, and Innovation

Unit Focus

In this exciting STEAM unit, students explore scientific concepts and engineering through hands-on experiences with Lego Education Science and Lego Education Spike. Using the engineering design process, students build and program devices that set objects into motion, applying scientific principles to complete real-world tasks. They experiment with motors to power their creations, learning how design, testing, and iteration can improve their solutions.

Throughout the unit, students investigate evidence that matter is made of particles too small to see, explore the effects of gravitational forces on Earth, and analyze how the number of daylight hours changes over the year. They deepen their understanding of energy flow by creating models that show how animals obtain energy from the sun through the food they eat. Students also engage in a culminating project to research and design solutions for protecting the environment, learning how communities apply science to real-world challenges.

In addition to science and engineering, students enhance their digital literacy skills by examining online behavior, identifying cyberbullying, and practicing strategies to respond safely and responsibly in digital spaces.

By the end of the unit, students will have developed critical thinking, collaboration, and problem-solving skills. They will be able to design, test, and refine innovative solutions, communicate their ideas effectively, and make connections between scientific concepts and the technology they build. This hands-on unit empowers students to see themselves as scientists, engineers, and 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) Mathematics: 5 - Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). - Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally. (CCSS.MATH.CONTENT.5.MD.B.2) Next Generation Science Standards Performance Expectations: 5	<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 ask questions, break challenges into smaller parts, and try out solutions to better understand and approach tasks. U2 Effective problem solvers recognize there can be multiple solutions, adapt their strategies, and persevere through challenges to build resilience. U3 Scientific concepts and patterns inspire technological designs and 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?

Stage 1: Desired Results - Key Understandings

- Develop a model to describe that matter is made of particles too small to be seen. (5- PS1-1)
- Support an argument that the gravitational force exerted by Earth on objects is directed down. (5-PS2-1)
- 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)
- Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (5-ESS1-2)
- Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1)
- 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)

CSTA: Computer Science Standards (2017)

3-5

- Test and debug (identify and fix errors) a program or algorithm to ensure it runs as (1B-AP-15)

ISTE Standards (2024)

ISTE Standards (2024): K-12

- Manage their digital identity and understand the lasting impact of their online behaviors on themselves and others and make safe, legal and ethical decisions in the digital world. (1.2.a.)
- Demonstrate empathetic, inclusive interactions online and use technology to responsibly contribute to their communities. (1.2.b.)
- Develop, test and refine prototypes as part of a cyclical design process. (1.4.c.)

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 use the design process, feedback, and technology to develop, test, and improve solutions.
U5 Effective collaborators share and respect ideas and adjust their thinking based on others' contributions.
U6 Technology provides tools to develop, test, and accomplish goals more effectively.

Q4 How can I use what I know to develop and test a design?
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 Gravity affects motion
K2 Models help to represent things that are too small to see indirectly
K3 Graphs help us visualize and interpret patterns in scientific data.
K4 Human activities can positively or negatively impact the environment.
K5 Communities use science and engineering solutions to address environmental problems.
K6 Collaborative discussions evaluate diverse ideas and progress forward through compromise, flexibility, and open-mindedness
K7 Plants use sunlight to make food (energy), which animals then eat
K8 Different data are best displayed in particular ways, including line graphs and pie charts.
K9 Cyberbullying is when someone uses digital devices, sites, and apps to intimidate, harm, and upset another person.
K10 A cyberbullying bystander observes a conflict or unacceptable behavior, but does not take part in it. A cyberbullying upstander does try to stop it.
K11 Online collaboration requires following digital etiquette and ethical behavior

Skill(s)

Students will be skilled at...

S1 Developing and using a model
S2 Explaining observable phenomena
S3 Defining a design problem that reflects a need or want
S4 Gathering and interpreting evidence (e.g., through experiments or observation) that shows how gravity affects motion.
S5 Using graphs or charts to represent observed changes
S6 Gathering and interpreting information from multiple sources (articles, videos, local data)
S7 Following rules for discussion and asking and answering questions
S8 Using a model to explain energy transfer
S9 Explaining the connection between sunlight, plants, and animals' energy
S10 Analyzing and explaining findings based on the line plot
S11 Developing, testing and designing prototypes as part of a cyclical design process
S12 Communicating respectfully and positively in all online communications
S13 Recognizing and avoiding cyberbullying, and knowing how to respond or report it