Sept. Gr. 1 Unit 1: Engineering

Content Area: **Science**
Course(s):
Time Period: **September**
Length: **6-8 Weeks**
Status: **Published**

Unit Overview

In this unit, students will explore engineering, learn the design process, investigate a problem, and use the design process to solve the problem.

Enduring Understandings

People who are engineers solve real world problems using a process called the design process.

We can work like engineers to solve problems.

Essential Questions

What is engineering?

How do engineers work?

What is the design process?

How can engineering be used to solve a problem?

Instructional Strategies & Learning Activities

- Unit 1: Engineering and Technology

  Engineering and Technology: Unit At a Glance

  Unit at a Glance for "Engineering and Technology" includes the unit table of contents, unit vocabulary words, and the vocabulary game, Guess the Word. In this unit, children will:
  - define and identify problems;
  - define and identify examples of technology;
  - describe how people understand problems and use technology to solve problems;

    - explore and apply a design process.

- Unit 1: Engineering and Technology
  Teacher Edition

  Engineering and Technology: Connecting with NGSS

  These opportunities for informal science learning provide local context and extend and enhance concepts from the unit "Engineering and Technology."

- Unit 1: Engineering and Technology
  Teacher Edition

  Engineering and Technology: 3D Unit Planning

  Planning resources are available for each lesson and hands-on activity in the unit "Engineering and Technology."

- Unit 1: Engineering and Technology
  Home Letter

  Engineering and Technology: Home Letter

  This is the home letter for the unit "Engineering and Technology."

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- Unit 1: Engineering and Technology

  Student eBook

  Engineering and Technology: Unit Opener

  The Unit Opener for "Engineering and Technology" introduces the unit project, Pocket Lock-It. During this unit project, children will:
    - Ask questions learn more information about why things fall out of a pocket.
    - Describe the characteristics of a tool or object that would solve the problem.
    - Plan and conduct an investigation to identify possible solutions to keep an object from falling out of a pocket.

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  Unit 1: Engineering and Technology

  Teacher eBook

  Engineering and Technology: Unit Opener

  The Unit Opener introduces the unit "Engineering and Technology" and the unit project, Pocket Lock-It.

- Unit 1: Engineering and Technology

  Teacher Edition

  Engineering and Technology: Unit Opener

  The Unit Opener introduces the unit "Engineering and Technology" and the unit project, Pocket Lock-It.
  Launch
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  Unit 1: Engineering and Technology

  Assessment Guide

  Engineering and Technology: Unit Test

  The Unit Test for "Engineering and Technology" assesses students' ability to apply knowledge to solve problems and explain phenomena in relation to the Performance Expectations associated with the unit. In this unit, children:
    - define and identify problems;
    - define and identify examples of technology;
    - describe how people understand problems and use technology to solve problems;
    - explore and apply a design process.

  Launch
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  Unit 1: Engineering and Technology

  Teacher Edition

  Engineering and Technology: Differentiate Instruction

  This page provides differentiated support for this unit's Science & Engineering Leveled Readers, "How Do You Investigate?" "How Do Engineers Solve Problems?" "Making a Car Go Faster," and "Design a Home for a Pet."

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  Unit 1: Engineering and Technology

  Online Assessment

  Engineering and Technology: Unit Pretest

  The interactive Unit Pretest for "Engineering and Technology" focuses on prerequisite knowledge. The test is composed primarily of DOK 1 items that evaluate student preparedness for the upcoming content.
  Launch
  Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?
    - Teacher eBook

Engineer It - How Do Engineers Use Technology?

During the lesson "Engineer It - How Do Engineers Use Technology?" children will explore how engineers make and use technology to solve problems.

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?
  Teacher eBook

  Engineer It - How Do Engineers Use Technology?: Take It Further

  During this Careers in Science & Engineering feature, children will investigate how packaging engineers design boxes, bottles, and other packages.

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Teacher eBook

  Engineer It - How Do Engineers Use Technology?: What Is Technology?

  During the activity "What Is Technology?" children will explore examples of technology and how structures in the natural world can inspire technology. They will then define a problem and gather information about it to design a solution. Finally, they will identify how the shape of the solution is connected to how it works.
  Launch

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Assessment Guide

  Engineer It - How Do Engineers Use Technology?: Lesson Quiz

  The Lesson Quiz for "Engineer It - How Do Engineers Use Technology?" provides a quick assessment of the learning goals and the portions of Performance Expectations aligned to the lesson. During this lesson, children explore how engineers make and use technology to solve problems.
  Launch

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Student Edition

  Engineer It - How Do Engineers Use Technology?

  By the end of this lesson, children will be able to describe how people understand problems and make technology.

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?
  Student Edition

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  Launch
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  Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Teacher Edition

  Engineer It - How Do Engineers Use Technology?: Engage

  During the lesson "Engineer It - How Do Engineers Use Technology?" children will explore how engineers make and use technology to solve problems.
  Launch
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  Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Online Assessment

  Engineer It - How Do Engineers Use Technology?: Lesson Quiz

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Launch

- Unit 1: Engineering and Technology Lesson 1: Engineer It - How Do Engineers Use Technology?

  Hands On Activity Worksheet

  Engineer It - How Do Engineers Use Technology?: Hands-On Activity (Editable)

  This is the editable Hands-On Activity worksheet for "Engineer It - Solve the Headphones Problem." During this activity, children will work collaboratively to define a problem, gather information about it, and build something to solve the problem.

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  Launch

Integration of Career Exploration, Life Literacies and Key Skills

Students will establish and follow rules, routines, and responsibilities throughout the year.

Students will learn about how engineers use technology.

	Different types of jobs require different knowledge and skills.
9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CAEP.9.2.4.A.2	Identify various life roles and civic and work - related activities in the school, home, and community.
CAEP.9.2.4.A.3	Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.
CAEP.9.2.4.A.4	Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Technology and Design Integration

This unit on technology lets the students explore different types of technology and its role in modern day society. They will create different products (see above in activities) using the design process and present their products to the class. Students will use the interactive textbook on the Smartboard.

TECH.8.1.2.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.2.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.2.B.CS2	Create original works as a means of personal or group expression.
TECH.8.2.2.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.2.A.2	Describe how designed products and systems are useful at school, home and work.
TECH.8.2.2.A.4	Choose a product to make and plan the tools and materials needed.
TECH.8.2.2.B.1	Identify how technology impacts or improves life.
TECH.8.2.2.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.
TECH.8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.
TECH.8.2.2.C.CS1	The attributes of design.
TECH.8.2.2.C.CS2	The application of engineering design.
TECH.8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.

Interdisciplinary Connections

Students go to the STEM lab bi-monthly to create hands-on projects that align with the unit.

Students will listen to and read non-fiction texts about engineering.

LA.RI.1.1	Ask and answer questions about key details in a text.
LA.RI.1.2	Identify the main topic and retell key details of a text.
LA.RI.1.3	Describe the connection between two individuals, events, ideas, or pieces of information in a text.
LA.RI.1.4	Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.
LA.RI.1.5	Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.
LA.RI.1.6	Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.
LA.RI.1.8	Identify the reasons an author gives to support points in a text and explain the application of this information with prompting as needed.
LA.RI.1.9	Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).

LA.RI.1.10	With prompting and support, read informational texts at grade level text complexity or above.

Differentiation

- Understand that gifted students, just like all students, come to school to learn and be challenged.
- Pre-assess your students. Find out their areas of strength as well as those areas you may need to address before students move on.
- Consider grouping gifted students together for at least part of the school day.
- Plan for differentiation. Consider pre-assessments, extension activities, and compacting the curriculum.
- Use phrases like "You've shown you don't need more practice" or "You need more practice" instead of words like "qualify" or "eligible" when referring to extension work.
- Encourage high-ability students to take on challenges. Because they're often used to getting good grades, gifted students may be risk averse.

- **Definitions of Differentiation Components**:

    - Content – the specific information that is to be taught in the lesson/unit/course of instruction.
    - Process – how the student will acquire the content information.
    - Product – how the student will demonstrate understanding of the content.
    - Learning Environment – the environment where learning is taking place including physical location and/or student grouping

Differentiation occurring in this unit:

See suggestions in the teacher manual for differentiation for struggling and advanced learners.

Modifications & Accommodations

Refer to QSAC EXCEL SMALL SPED ACCOMMOCATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

IEP and 504 accommodations will be utilized.

Benchmark Assessments

Benchmark Assessments are given periodically (e.g., at the end of every quarter or as frequently as once per month) throughout a school year to establish baseline achievement data and measure progress toward a standard or set of academic standards and goals.

Schoolwide Benchmark assessments:

Aimsweb benchmarks 3X a year

Linkit Benchmarks 3X a year

DRA

Additional Benchmarks used in this unit:

Teacher will use the assessments located in the series to compare growth over time.

Formative Assessments

Assessment allows both instructor and student to monitor progress towards achieving learning objectives, and can be approached in a variety of ways. **Formative assessment** refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for helping to shape learning, and can even bolster students' abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks (Trumbull and Lash, 2013). It can include students assessing themselves, peers, or even the instructor, through writing, quizzes, conversation, and more. In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs (Theal and Franklin, 2010, p. 151).

Formative Assessments used in this unit:

Self-Check and Unit Reviews

Summative Assessments

Summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Summative assessments for this unit:

Self-Check and Unit Reviews

Instructional Materials

HMH Science Dimensions program materials

Materials listed for hands on exploration.

Materials for the STEM lab

Standards

K-2-ETS1	Engineering Design
K-2-ETS1-1.1.1	Ask questions based on observations to find more information about the natural and/or designed world(s).
K-2-ETS1-1.1.2	Define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-1.ETS1.A.1	A situation that people want to change or create can be approached as a problem to be solved through engineering.
K-2-ETS1-1.ETS1.A.2	Asking questions, making observations, and gathering information are helpful in thinking about problems.
K-2-ETS1-2.ETS1.B.1	Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.
K-2-ETS1-2.6.1	students observe the shape and stability of structures of natural and designed objects are related to their function(s).
K-2-ETS1-3.4.1	Analyze data from tests of an object or tool to determine if it works as intended.
K-2-ETS1-3.ETS1.C.1	Because there is always more than one possible solution to a problem, it is useful to compare and test designs.
ED	Engineering Design
	Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.
8.2.2.ED.1	Communicate the function of a product or device.
8.2.2.ED.2	Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
8.2.2.ED.3	Select and use appropriate tools and materials to build a product using the design process.
	Limitations (constraints) must be considered when engineering designs.
8.2.2.ED.4	Identify constraints and their role in the engineering design process.
ITH	Interaction of Technology and Humans
	Human needs and desires determine which new tools are developed.

8.2.2.ITH.1	Identify products that are designed to meet human wants or needs.
8.2.2.ITH.2	Explain the purpose of a product and its value.