Sept. K Unit 1: Engineering and Technology

Content Area: **Science**
Course(s):
Time Period: **September**
Length: **4-5 Weeks**
Status: **Published**

Unit Overview

This unit explores Engineering Design and Technology.

Enduring Understandings

Engineers use a design process/loop to solve a problem, create a solution and test the solution, and return to improve the solution.

Essential Questions

What is the design process and how do we use it to solve problems?

Instructional Strategies & Learning Activities

- Unit 1: Engineering and Technology

  Student Edition

  Engineering and Technology: Unit Opener

  The Unit Opener for "Engineering and Technology" introduces the unit project, Design a Coin Sorter. During this unit project, children will:
  - Define and solve the simple problem of sorting coins into like groups by developing a new or improved coin sorter.
  - Analyze data from tests to determine if it works as intended.

  Unit 1: Engineering and Technology

  Student Edition

  Engineering and Technology: Unit Performance Task: Engineer It - Build an Airplane

During the Performance Task "Engineer It - Build an Airplane," children will define a problem, develop a model, and analyze data about the shape and stability of the solution, and compare and test their designs.
Launch

- Unit 1: Engineering and Technology
Student Edition

Engineering and Technology: Unit Review

The Unit Review assesses student understanding of key ideas and concepts from the unit "Engineering and Technology."
Launch

- Unit 1: Engineering and Technology
- You Solve It

Off to the Races!

In Off to the Races, students design, test, and evaluate a model car. Design elements include body shape, weight placement, fins, a spoiler, and sails.
Launch

- Unit 1: Engineering and Technology
You Solve It

Off to the Races! (Teacher)

Teacher support materials are available for "Off to the Races!" During this activity, students will design, test, and evaluate a model car. Design elements include body shape, weight placement, fins, a spoiler, and sails.
Launch

- Leveled Readers - Blue

- On-Level: How Can We Solve Problems?

The leveled reader "How Can We Solve Problems?" is designed for on-level readers and can be used to enrich key concepts from the unit "Engineering and Technology."
Launch

- Unit 1: Engineering and Technology
Leveled Readers - Green

Enrichment: Make a Better Bird Feeder

The leveled reader "Make a Better Bird Feeder" is designed for above-level readers and can be used to extend key concepts from the unit "Engineering and Technology."
Launch

- Unit 1: Engineering and Technology
Leveled Readers - Red

Extra-Support: How Can We Solve Problems?

The leveled reader "How Can We Solve Problems?" is designed for below-level readers and can be used to reinforce key concepts from the unit "Engineering and Technology."
Launch

- Unit 1: Engineering and Technology
Online Assessment

Engineering and Technology: Unit Test

The interactive 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 a simple problem that can be solved by developing a new or improved tool;
  - ask questions, make observations, and gather information helpful in thinking about a problem;
  - create a model based on evidence to represent a tool that solves a problem;
  - compare and test design solutions to a problem;
  - use sketches and models to communicate a solution to a problem.

Unit 1: Engineering and Technology

  - Home Letter

    Engineering and Technology: Home Letter

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

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Integration of Career Exploration, Life Literacies and Key Skills

Students will explore STEM careers

	Different types of jobs require different knowledge and skills.
9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
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).
	Critical thinkers must first identify a problem then develop a plan to address it to effectively solve the problem.
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).

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.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.CRP12	Work productively in teams while using cultural global competence.
CAEP.9.2.4.A.1	Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.
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

Smartboard lessons and technology.

Online Student Textbook

Online Student Simulations

	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.
	Human needs and desires determine which new tools are developed.

Interdisciplinary Connections

Leveled Science Readers

LA.RI.K.1	With prompting and support, ask and answer questions about key details in a text.
LA.RI.K.2	With prompting and support, identify the main topic and retell key details of a text.
LA.RI.K.3	With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
LA.RI.K.4	With prompting and support, ask and answer questions about unknown words in a text.
LA.RI.K.5	Identify the front cover, back cover, and title page of a book.
LA.RI.K.6	Name the author and illustrator of a text and define the role of each in presenting the ideas or information in a text.
LA.RI.K.7	With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts).

LA.RI.K.8	With prompting and support, identify the reasons an author gives to support points in a text.
LA.RI.K.9	With prompting and support, identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).
LA.RI.K.10	Actively engage in group reading activities with purpose and understanding.
MA.K.G.A.2	Correctly name shapes regardless of their orientations or overall size.

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 differentiation suggestions in Instruction above, 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:

Pretest followed by interactive assessments

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:

See assessments embedded in Instruction above.

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:

See assessments embedded in Instruction above.

Instructional Materials

HMH Science Demensions program materials

Misc. items for hands on labs

Standards

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-ETS1-2.2.1	Develop a simple model based on evidence to represent a proposed object or tool.
K-2-ETS1-3.4.1	Analyze data from tests of an object or tool to determine if it works as intended.
K-2-ETS1-2.6.1	students observe the shape and stability of structures of natural and designed objects are related to their function(s).
K-2-ETS1-1.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-ETS1-1.ETS1.A.3	Before beginning to design a solution, it is important to clearly understand the problem.
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-ETS1-3.ETS1.C.1	Because there is always more than one possible solution to a problem, it is useful to compare and test designs.