

ENGINEERING UNIT PLAN



Unit Summary

The purpose of this unit is not only to introduce the engineering process to students but to give them a window into the wide variety of applications of this process and the career possibilities available. In this unit, students will get hands-on experience by *executing* the engineering design process. They will identify problems, brainstorm solutions, and determine tradeoffs and constraints. By the conclusion of this unit, students will have a deeper understanding of the NGSS Engineering Design Disciplinary Core Ideas through real-life connections and authentic experiences.

NGSS Standards Alignment:

Middle School	
Standards	Lessons & Activities
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles	• Engineering Design Process Google Slides • Engineering Design Process Reading

and potential impacts on people and the natural environment that may limit possible solutions.	
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	• Spaghetti or Foil Tower Challenge
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	• Invention Convention Project
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	

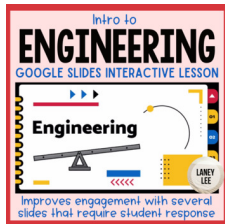
Enduring Understandings

Enduring Understandings

- The Engineering Design Process is a method that is used to solve technological challenges to change and improve products for the way we live.
- Design is important in the function of an object
- There is always more than one possible solution to a problem, so it is useful to test and compare designs.

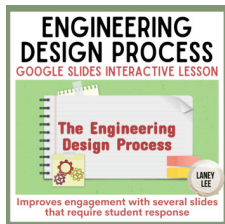
Included Resources

Teach



[Intro to Engineering Google Slides](#)

Introduce students to the wonderful world of applied science in the four main engineering fields: civil, mechanical, electrical, and chemical. Some important engineering vocabulary will be touched on as well. This lesson uses the internet as students are given a chance to explore recent developments in all engineering fields. Science is relevant!



[Engineering Design Process Google Slides](#) **BEST SELLER**

Use this lesson to guide students through the engineering design process, including relevant vocabulary. Both this presentation and the Intro to Engineering presentation are designed to be interactive. You can assign the slides to students to complete, use those slides as chances for whole group or small group discussions, or use interactive technology such as Nearpod or Peardeck. However you decide to structure it, make sure you're not doing all the talking! Keeping students involved in the lesson will increase their enjoyment and engagement, as well as save your voice and energy!

Activities



[Spaghetti or Foil Tower Challenge](#) **BEST SELLER**

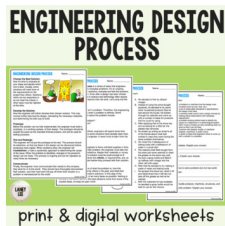
I like to start my unit with this fun hook. The spaghetti and marshmallow towers are a fan favorite, but I've recently switched to using aluminum foil instead. I distribute about 2 feet of aluminum foil and a bit of tape to each student or group, set a timer, and let them experience the whole engineering process independently, especially failure. This experience should anchor the students' learning throughout the rest of the unit.



[Bill Nye: Inventions Viewing Guide](#)

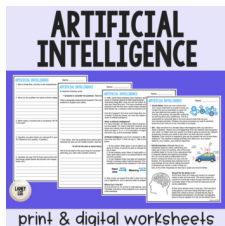
What kind of teacher would you be if you didn't introduce our students to some of the greatest science teachers of our time: Bill Nye and Mrs. Frizzle. Take a 20-minute break while the kids shout, "BILL! BILL! BILL!"

Practice



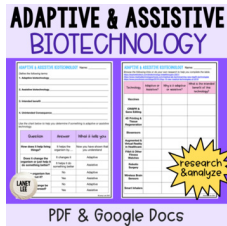
[Engineering Design Process Reading](#) **BEST SELLER**

This resource makes a great homework or classwork activity that can be used to review the engineering design process. I really like to use these reading resources in-class time to work on scientific literacy and close reading strategies. It's my opinion that students absolutely need to be reading in every single classroom to support literacy standards.



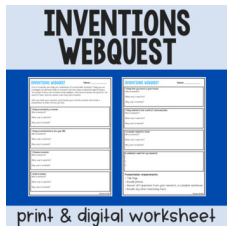
[Artificial Intelligence Reading](#)

Computer science is a growing engineering field and should definitely be addressed in your unit. This resource brings up a lot of modern technology that your students likely use daily and should generate some interesting discussion about data usage and algorithms.



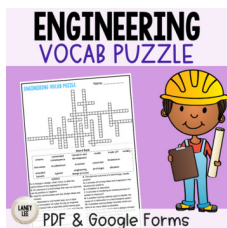
[Bioengineering Online Practice](#)

Use this web-based activity to investigate medical engineering. It's important for students to maintain an open mind about all the different aspects and applications of engineering, and this resource is a great sub-plan or silent workstation.



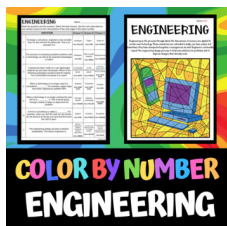
[Inventions Webquest](#) **BEST SELLER**

Unless you need to save this one for a day off, this webquest is a great follow-up to the Bill Nye video. Students will do their own research to discover a variety of inventions from the past and present.



[Vocab Crossword](#)

Review key vocabulary with this simple crossword. Work in groups, assign it for homework, or use it for bellwork!



[Color by Number](#)

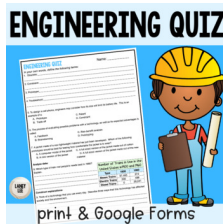
Review key concepts, relax, and decorate your classroom using this color-by-number activity. This resource makes a great review, and I love having a chance to build relationships while students complete activities that are accessible to all learners.

Review & Assess



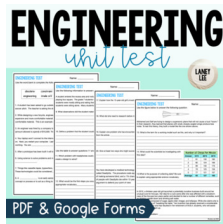
[Engineering AI Activities](#)

Prepare your students for the future by bringing AI to your science classroom! This resource is designed to introduce students to the exciting world of artificial intelligence and its applications through interactive, creative activities that teach students about the uses and limitations of AI.



[Engineering Formative Quiz](#)

Perhaps right before beginning their summative project is a good time to quiz the students on their learning so far. This is a quick quiz that shouldn't take more than half an hour of class time.



[Engineering Unit Test and Study Guide](#)

I like to do two summative grades per unit. One performance-based and one written. This unit test is designed to satisfy that second requirement. Test your students' learning and understanding with this test, which covers various question types and levels.

Projects



[Invention Convention Project \(2 weeks\)](#) **BEST SELLER**

The Invention Convention is a crowd favorite at my school and a best seller in my store! To truly learn about engineering, students must create! This fun 7-day project takes students through all the steps of designing, planning, and creating their own technology. Daily intro lessons are included (less than 10 minutes each), as well as a student booklet that can be used as a daily log. Check out some more of our student work [here](#). Note: I would definitely count this project as a summative grade.

Resources by Concept

Concept 1: What is Engineering?

- [Intro to Engineering Google Slides](#)
- [Vocab Crossword](#)

Concept 2: Engineering Design Process

- [Engineering Design Process Google Slides](#)
- [Spaghetti or Foil Tower Challenge](#)
- [Engineering Design Process Reading](#)
- [Color by Number](#)
- [Invention Convention Project](#) (2 weeks)

Concept 3: Inventions & Technology

- [Bill Nye: Inventions Viewing Guide](#)
- [Inventions Webquest](#)
- [Artificial Intelligence Reading](#)
- [Bioengineering Online Practice](#)

Suggested Pacing

Week 1: What is Engineering?

Start your unit with a fun hook using the [Spaghetti or Foil Tower Challenge](#). From there, jump straight into an exploratory lesson with [Intro to Engineering Google Slides](#). Then, cover the steps of the Engineering Design Process with the [Engineering Design Process Google Slides](#) and follow up with [Engineering Design Process Reading](#) for homework or classwork.

Week 2: Inventions & Technology

Next, dive in deeper by allowing students to investigate some famous inventions and the cutting edge of technology in different areas of engineering. Most of these resources can really be used in any order, but I'd start with [Bill Nye Inventions Viewing Guide](#) (great for a day when you need a break) and the [Inventions Webquest](#) to set the scene. After completing the [Bioengineering Online Practice](#) and [Artificial Intelligence Reading](#), hopefully, you'll have some rich discussions in your class. Maybe toss in the [Engineering Formative Quiz](#) at the end of this week for a quick assessment.

Week 3-4: Apply Concepts with the Invention Convention

Now that your students have a solid foundation in the concepts and process of engineering, allow them to become inventors with the [Invention Convention Project](#)! This resource is sure to create some lasting memories. All necessary materials for this project are included in the PDF.

Week 5: Review & Assess

Finally, cement your students' learning using the [Color by Number](#) and the [Vocab Crossword](#). Of course, these can be used at any other time in the unit if you're planning a sub day. Finish the unit off with the [Engineering Unit Test and Study Guide](#)

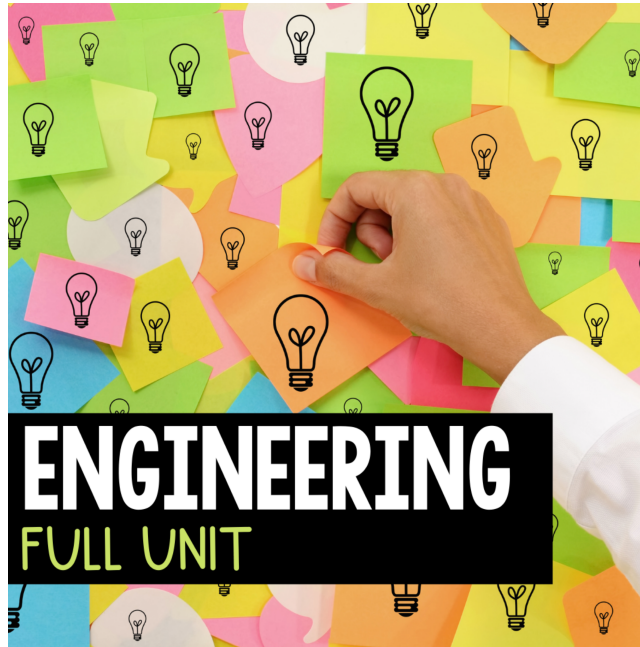
Key Vocabulary

Engineering Design Process	The formulation of a plan to help an engineer build a product with a specified performance goal. This process involves several steps and may be repeated many times
intended benefit	The planned outcome of technology, usually positive
unintended consequence	An outcome of a technology that was not planned can be positive or negative
research and development	A specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace
model	Used to communicate and test design ideas and processes
innovation	A process of modifying an existing product or system to improve it
troubleshoot	A problem-solving method used to identify the cause of a malfunction in a technological system
invention	A process of turning ideas and imagination into devices and systems
constraint	A limitation or restriction

system	a set of principles or procedures according to which something is done; an organized scheme or method.
modify	A change in design, often minor, to alter the performance of the engineered product
tradeoff	A situation that involves losing one quality, aspect or
brainstorm	amount of something in return for gaining another quality
prototype	A working model used to test a design concept by making observations and necessary adjustments
obsolete	A discarded or outmoded type; out of date
iteration	the process of doing something again and again, usually to improve it

Download the Unit!

If you've enjoyed this unit guide, please download the full unit by clicking below. With your purchase, you will enjoy free lifetime updates, and any additional resources added to this unit will be yours for free as well!



<https://www.teacherspayteachers.com/Product/Engineering-FULL-UNIT-3417155>

Next Steps:

Jump into your next free planning resource:

Life Science

Earth & Space

Physical Science

Other

Full Year Pacing

	Science			Guides
Human Body Systems	Geology	Force & Motion	Scientific Method	Life Science
Cells	Astronomy	Energy & Work	Engineering	Physical Science
Mitosis & Meiosis	Weather & Climate	Matter		Earth & Space Science
Reproduction & Heredity	Natural Hazards	Atoms & The Periodic Table		
DNA	Human Impact	Bonding & Reactions		
Evolution		Electric & Magnetic Forces		
Ecosystems		Waves		
Photosynthesis & Respiration				

I'd love to stay in touch! Below are some ways we can stay connected:

- I host a [Middle School Science Teachers](#) group on Facebook where we discuss best practices and share ideas and resources. Feel free to join that to participate in some great discussions!
- Find me on [Instagram](#)!
- [Sign up](#) for my newsletters to receive free resources every month!
- Email me at lanyleeteaches@gmail.com

Looking forward to hearing from you soon!

