



Vaccine Distribution – Teacher Guide

Lesson Summary:	Lesson Objectives:
<p>In this lab, students are introduced to supply chain engineering, where they will learn about the most efficient way to distribute various amounts of the COVID-19 vaccine to cities around the country. After an introduction to the Engineering Design process, as well as to Supply Chain itself, students will play a supply-chain simulator game. They will then follow a google sheet with the instructions to the vaccine supply chain activity, where they will need to make decisions and adjust to various supply chain obstacles.</p> <p>Curriculum Connections:</p> <ul style="list-style-type: none">• <u>Mathematics</u>: finding the optimal solution• <u>Engineering</u>: problem solving to find a solution that satisfies the design requirements while adhering to the design constraints	<p>Students will be able to -</p> <ul style="list-style-type: none">• Analyze different methods involved in distribution and the pros and cons of each• Describe the importance of supply chain in Engineering• Design and build their own distribution routes for the vaccine• Explain the engineering process as it pertains to their design <p>Content Vocabulary/Terms:</p> <ul style="list-style-type: none">• <u>Supply Chain</u>: the sequence of processes involved in the production and distribution of a commodity.• <u>Industrial Engineering</u>: engineering profession that is concerned with the optimization of complex processes, systems, or organizations• <u>Operations Research</u>: discipline that deals with the application of advanced analytical methods to help make better decisions• <u>Data Analyst</u>: someone who scrutinises information using data analysis tools. The meaningful results they pull from the raw data help their employers or clients make important decisions by identifying various facts and trends

Materials:

- Computer, access to google slides and sheets

Teacher Notes:

- Students will work through the [interactive student workbook presentation](#).
- When assigning this lesson on Google Classroom, first make a copy of the slides to save within your Google Drive, then make a copy for each student.
- The slideshow is designed in order to be interactive, this way students can type directly on the slides.
- Each slide of the presentation provides an activity for students to complete (reading, watching a video, inserting images, answering questions, etc.)
- Students may work individually or within groups.



Assessment:

- Informal assessments can be completed by looking at the interactive slides within the slideshow, especially within the final reflection slide.
 - An **answer key** for the interactive student slides can be given upon teacher request.
- Assessments outside the interactive slides are suggested below as Pre and Post Work Ideas.

Troubleshooting Tips:

- Game #1:
 - Have the students try this at least 3 different times, starting with 3 different random starting states. The solution doesn't need the numbers to be in order, just that the boxes are 'reachable' from the top by a crane in the order 1 through 8. If you had to use your math skills to optimize this problem (i.e. rearrange the stack in the smallest number of moves), what would you do?
 - Note that it's not realistic to have an empty space in the middle of the stack, and moves aren't normally sideways slides, but go with it as part of this exercise!
- Game #2:
 - Optimal Results:

Optimal Routes				
Rail Strike in Den Construction in Chic Flooding in Houston	Base	Sea -> Den (Rail)	Den -> Hou (Rail)	Hou-> Final (Rail)
	1	Sea -> Bil (Rail)	Bil -> Hou (Rail)	Hou-> Final (Rail)
	2	Sea -> Den (Rail)	Den -> Hou (Rail)	Hou-> Final (Rail)
	3	Sea -> Den (Rail)	Den -> Chic (Rail)	Chic -> Final (Truck)
	1 & 2	Sea -> Bil (Rail)	Bil -> Hou (Rail)	Hou-> Final (Rail)
	2 & 3	Sea -> Den (Rail)	Den -> Nash (Rail)	Nash -> Final (Rail)
	1 & 3	Sea -> Bil (Rail)	Bil -> Chic (Rail)	Chic -> Final (Truck)
	1 & 2 & 3	Sea -> Bil (Rail)	Bil -> Nash (Rail)	Nash -> Final (Rail)

Pre Work:

- [Intro Presentation](#)

Pre Work- Introduction to the Engineering Design Process:

- Students should complete the [Engineering Design Process Introduction Activity](#) before beginning the lab
 - NOTE: This activity only needs to be completed before the student's **first** ET lab, not repeated for every lab



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Lab:

- [Student Interactive Workbook](#)

Post Work:

- [Wrap-Up Activity](#)

Extension Activities:

- Play [Quizlet](#) or [Kahoot](#) to review concepts concerning _____



Next Generation Science Standards:

[HS-ETS1-4](#): Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.