



Special Delivery – Design a vaccine delivery solution

STEM Global Educator Workshop Pacific Science Center's Tinker Tank

- pacificsciencecenter.org
- <https://www.wghalliance.org/initiative/stem-global/resources/>

Time: 1 50-minute class period with suggestions for extending the activity

Subject & Grade Level(s): MS-HS engineering design

Brief Overview: An authentic design problem is the delivery of vaccines to people living in remote villages around the world. Many remote areas struggle to receive necessary vaccines for various reasons, including rough terrain between medical facilities and villages and towns that is impassable to most vehicles. This activity engages students in the engineering design process as they design, build, and test a model of a vehicle capable of traveling rough terrain without damaging the vaccines it is transporting. In this simulated design task, students use K'nex and LEGO building materials to construct a vehicle that can travel along a LEGO track simulating rough terrain. This activity could be used to introduce students to the engineering design process. Suggestions are provided for increasing the complexity of the design challenge (e.g., carry more than one container, design a vehicle without wheels, etc.) as well as for incorporating an additional design challenge focused on the cold chain process of vaccine delivery.



STUDENT UNDERSTANDINGS

Anchoring Phenomenon/Design Problem: Many remote areas struggle to receive necessary vaccines for various reasons, including rough terrain between medical facilities and villages and towns. Your challenge is to design and build a model of a vehicle to transport these vaccines over rough terrain. You will use K'nex and other building materials

to construct your model vehicle, which must be capable of safely carrying a container filled with “vaccines” from one end of a track to the other without spilling any contents. To simulate a vehicle driving between two destinations, your model vehicle will be pulled at a constant rate by a winch and attached to the winch by way of a small binder clip.

Driving Questions:

- How can a vehicle be designed so that it can travel rough terrain and safely deliver vaccine vials while meeting specific design criteria and constraints?
- How does an understanding of the engineering design process inform the design work, especially the concepts of tinkering and iteration?

NEXT GENERATION SCIENCE STANDARDS

This lesson builds toward the following middle school and high school level Performance Expectations (PEs) from the Next Generation Science Standards.

Middle School PE:

- **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. (With lesson extensions focused on re-design and optimization).

High School PE:

- **HS-ETS1-2:** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Download this lesson plan and associated student handouts at the STEM Global Resources page: <https://www.wghalliance.org/initiative/stem-global/resources/>

Credit: *This activity was originally developed by Pacific Science Center for use in their Tinker Tank program and adapted for a STEM Global Teacher Workshop in April 2019. Pacific Science Center is an independent, not-for-profit institution located in Seattle, WA that ignites curiosity and fuels a passion for discovery, experimentation, and critical thinking. This activity was authored by Brittany Strachota, PSC Tinker Tank Program Lead. Lesson plan adaptations supported by Kristen Bergsman of Laughing Crow Curriculum.*