



## **Engineering to the Rescue! Using Engineering to Teach Fifth Grade Physical Science (Curriculum Exchange)**

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Aran W. Glancy is a Ph.D. candidate in STEM Education with a focus on mathematics education at the University of Minnesota. Aran is currently working on supporting elementary and middle school teachers in integrating science and mathematics through engineering design. Additionally, he is investigating modeling within K-12 mathematics classrooms, and is also interested in enhancing mathematics education through the integration of science, engineering, and computer programming.

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**Target Grade Level: 5<sup>th</sup> Grade**

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## **Project Description**

The *EngrTEAMS* project is an engineering, design-based approach to teacher professional development that has 50 teachers per year designing curricular units for science topic areas related to the Next Generation Science Standards. The project includes summer professional development and curriculum writing workshops, paired with coaching, to allow teams of teachers to design engineering curricular units focused on science concepts, meaningful data analysis, and measurement. Each unit goes through an extensive design research cycle to ensure its quality and is published in an online format.

## **Unit Description**

This unit is designed for students in grade 5 to learn about force and motion as well as engineering design. The unit is centered around a central problem: rescue vehicles need to be able to cover a variety of different terrains to get to stranded victims during natural disasters such as floods or severe storms. In this unit, students are tasked with designing a vehicle that can speed up, slow down, and turn on smooth and rough surfaces as well as in water. As they develop background knowledge necessary for this task they learn about forces and friction.

## **Unit Summary**

Lesson	Objectives
<b>Lesson 1: Friction Sleds</b>	Students learn about friction as they measure the force required to drag a sled across different surfaces. They then investigate the effect of changing the mass of the sled has on friction. Once done, they use their data to make a prediction.
<b>Lesson 2: Hovercrafts</b>	Students build hovercrafts out of balloons and CDs and investigate how a force can change its motion.
<b>Lesson 3: Rubber band cars</b>	Students build rubber band cars and investigate how a greater force produces a greater change in motion.
<b>Lesson 4: Roto planes</b>	Students learn how forces can cause objects to turn by building spinners powered by propellers.
<b>Lesson 5: Design a Rescue Vehicle</b>	Students apply their knowledge of forces and friction as they build a rescue vehicle that can move, turn, and travel on water. They can choose to build a wheeled vehicle or hovercraft, and they have several options for a propulsion system. They must decide how to combine and arrange all of these elements to a build a prototype that can navigate the test course.