KID SPARK CARGO RACER CHALLENGE

OVERALL TIME *60- to 75-minute lesson*

GROUPS *Three to four kids per kit*

> **Next Generation Science Standards**
>
> **3-5-ETS1-3**
>
> (4th grade and up)
> *Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.*

OBJECTIVE

Kids will apply the Engineering Design Process to solve a problem.

OVERVIEW

Kids will have the opportunity to work together as a team to solve a problem using the Engineering Design Process. The team will use the engineering design process to guide them as they brainstorm ideas, plan, test, modify, and retest their design. Add collected measurement data to the class chart to see which team's vehicle traveled the farthest.

MATERIALS

- **ROK Blocks or Foundational Fluencies kit**
- **Tape measure**
- **Paper**
- **Pencils**
- **Masking tape**
- **Chart paper**
- **Ramp (optional)**
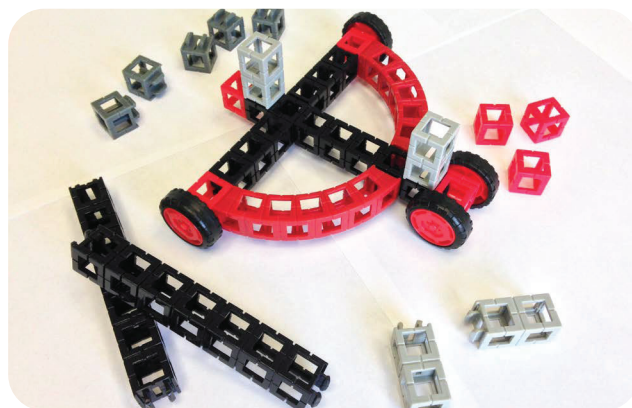
PREPARATION

- Create a class team chart with a row for each team, and a column to record the distance their vehicle traveled

- Set up an area where kids can complete a test run

- One piece of tape per team labeled with the team's name or number

LAUNCH *5 to 10 minutes*

Introduce the Engineering Design Process with the group. Each child will have a job in the challenge. Share the list of job roles and tasks assigned to each child. Provide teams with two minutes to decide on the different job roles.

Organizer: helps decide roles, holds all kids accountable, and keeps track of time.

Technician: measures, sketches, and makes sure data is recorded.

Programmer: completes tests and the final run; and is in charge of making modifications.

Reporter: takes notes on experiments and reports conclusions.

CHALLENGE

Introduce the challenge to the teams: The objective of this challenge is to have a vehicle that can travel the farthest distance going down a ramp carrying a load of 12 balls (6 red and 6 blue) from the kit. All balls must remain inside of the vehicle while traveling down the ramp. The vehicle that goes the farthest will win the challenge.

EXPLORATION *45 to 50 minutes*

Give teams 30 minutes to design and build a vehicle. Walk around to each group as they are designing and talk with the youth.

Possible questions to ask:

- *What are your ideas for the design?*
- *How did you decide?*
- *Did everyone contribute?*

Give time warnings along the way to keep teams on track. Suggested times: halfway, 10 minutes left, five minutes left, one minute left

Encourage groups to test and modify their design as they go and allow them to use the ramp to practice.
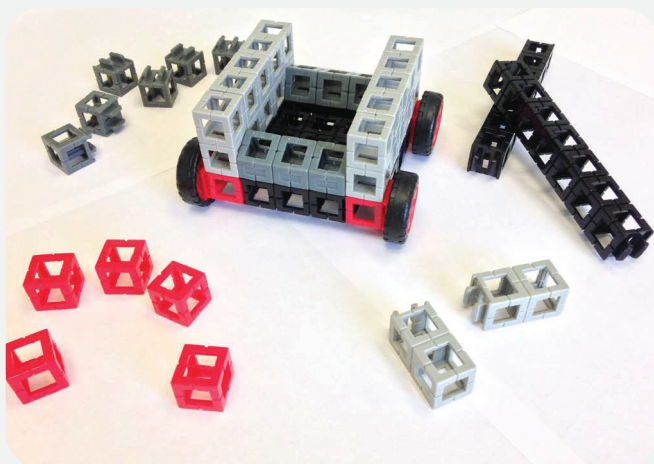
OFFICIAL RUNS *10 minutes*

The ramp should be viewable by all kids. Choose a team to go first and have the Programmer from each team come up to complete the official run for the vehicle. As each vehicle goes down the ramp, have a piece of masking tape ready with the team number and place it where the vehicle stopped. Then, have the Technician measure the distance the vehicle traveled and record data on the class chart. Continue until all teams have had the opportunity to test their vehicle.

Encourage teams to cheer each other on.

CLOSING *5 to 10 minutes*

Call on the Reporter from each team to answer the following questions. If they need help, they can call on someone from their team to answer. A variation could be to have each child answer the following questions on an exit slip.

- *How did your design work?*
- *Did your team test the design before the official run?*
- *What changes did you make after the test run?*
- *If you could go back, what would you do differently now?*
- *How did each of your teammates work together?*

Take time for teams to thank each other for being a part of their learning community.

CLEAN UP *5 minutes*

Have children break apart vehicles and use the ROK Blocks or Foundational Fluencies guide to put all the materials back in the box.

ENRICHMENT AND NEXT STEPS

Change the challenge and have teams design vehicles to meet a new standard – which can travel the furthest, carry the heaviest load the furthest, or a vehicle only using two wheels – the possibilities are endless!