



# HOW DO YOU MOVE AN ELEPHANT?

## Overview

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Book: *The One and Only Ivan* by Katherine Applegate

Grades 3-7

It is not easy to move an elephant. The people helping Ruby worked for many days to get it right. In this PBL lesson, the students will use the engineering design process to create a means of transporting a “baby elephant”.

## Standards

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3-5-ETS-1 MS-ETS-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS-2 MS-ETS-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5-ETS-3 MS-ETS-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of model or prototype that can be improved.

## Objectives

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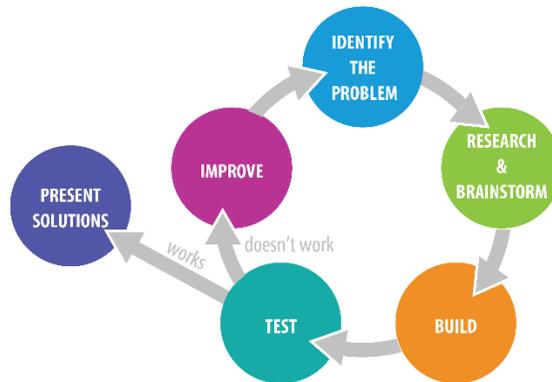
Students will create a prototype.

Students will develop a method to get one object inside the prototype.

Students will test the prototype.

Students will make adjustments to the prototype to improve success rate.

## ENGINEERING DESIGN PROCESS



### Materials Required

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Small potatoes – one per group

Strong string with a sturdy hook (bent paper clip) attached

A variety of construction materials which may include:

- Aluminum foil
- Bubble wrap
- Cardboard
- Craft sticks
- Dowel rods
- Masking tape or duct tape
- Newspaper
- Paper clips
- Pipe cleaners
- Rubber bands
- Straws
- String or yarn
- Styrofoam packing materials
- Toilet paper or paper towel tubes

## Procedure

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1. Reread the section about transporting Ruby to the zoo. Remind students that she was afraid of the claw-stick. Tell students the potato will represent Ruby. At the end of the activity there should be no marks or bruises on the potato.
2. Mark out a distance of 36 inches on a table top.
3. Tell students that there are two parts to this problem. First, they must create a prototype to move the potato 36 inches. This object must have a “hitch” that will allow the hook and string to be attached. This will pull the prototype. Second, they must figure out a way to get the potato into the transport item without picking it up (no one could pick up an elephant) and without poking it in any way that would damage the skin.
4. Divide students into groups of 4-5.
5. Show students the construction materials available. Remind students that their prototype must include a place to attached the hook.
6. Have students take some time to brainstorm ideas for the transportation object. Encourage sketching ideas on scratch paper.
7. Allow students plenty of time to create the prototype.
8. When groups are finished, test the prototypes.
  - Set the prototype and potato on the table. Have students demonstrate the method they plan to use to get “Ruby” into the transport object.
  - Have students prove that they can move her the full 36 inches without the potato falling out or their prototype falling apart.
9. If students do not succeed, allow time for adjustments. Those who do succeed should determine if enhancements can be made to strengthen the prototype.

## Extensions

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1. Create an obstacle course for students to test their prototypes. Create a path that is longer than 36 inches, that has turns, ramps, tunnels, bumps etc.

2. Have students write a story about Ruby’s journey from the mall to the zoo. What happened along the way? What was Ruby thinking about? What did she see? How was she feeling?
3. Have students draw a prototype for moving a giraffe, whale, rhinoceros, or other very large animal.

## Rubric

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RUBRIC	Exceeds (3)	Meets (2)	Partially Meets (1)	Does Not Meet (0)
LOADING AND MOVING	Potato was not damaged during loading or moving process.	Potato was slightly damaged during loading or moving process.	Potato was somewhat damaged during loading or moving process..	Potato was badly damaged during loading or moving process..
TRANSPORT PROTOTYPE	Prototype was able to move the full 36 inches and stayed completely in tact.	Prototype was able to move the full 36 inches, but began to fall apart.	Prototype was able to move a portion of the 36 inches and began to fall apart.	Prototype was unable to move a portion of the 36 inches and completely fell apart.
ADJUSTMENTS	Made adjustments that strengthened or enhanced the design	Made adjustments that allowed object to complete the requirements of the project.	Made adjustments that allowed the object to perform better than previous effort.	Adjustments did not help the design in any way.
DEMONSTRATION OF KNOWLEDGE OF THE ENGINEERING DESIGN MODEL	Does a great job showing an understanding of the engineering design process.	Does an okay job with showing an understanding of the engineering design process.	Tries but has a difficult time showing an understanding of the engineering design process.	Does not show an understanding of the engineering design process.
Total	N/12			

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