

Materials Needed

- Assortment of beans (pinto, navy, great northern, kidney, black, lima, etc.)
- Stopwatch or equivalent
- Paper, pen and or pencil

Materials to make the run such as:

- Cardboard or cereal box
- Scissors
- Sticky tape
- Paper or plastic cup

Grade Range

K-5

Topics/Skills

Forces and motion

Learning Standards

NGSS: [Motion and Stability](#)

NGSS: [Engineering Design](#)

Duration

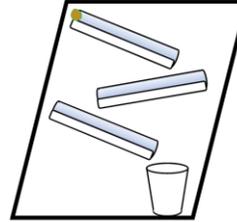
30-45 minutes

Prep Time

15-20 minutes

Bean Race

Design a Racetrack for Beans!



Which bean is faster? In this activity, students are challenged with designing and building a run for beans to race. Students make predictions on which beans will be the fastest, and slowest, and record their findings. Happy racing!

Activity Challenge

Design and build a downhill (inclined) run that zigzags and conduct a bean race.

Preparation

1. Choose and gather materials and select workspace.
2. Make a chart to record the beans and their times. Use the table on the last page.

To Do

To build the run:

1. Discuss and sketch a run design on paper.
2. Choose a back wall for the run. (20-inches x 20-inches is suggested). The back wall will be where the run's chutes are taped.
3. Attach a cup to the bottom of the run to catch the beans.
4. Build the chutes for the run. Do this by cutting strips out of cardboard, cereal boxes, or paper towel tubes and taping them to the run's back wall. Use the design sketch as guidance.
5. Do a few test runs to make sure each chute is at the correct angle. Readjust chutes as needed.

To test the beans:

1. Make predictions on the table.
2. Decide the order in which to test the beans.
3. One by one, have each bean "race" the track and time it.

Observations

- Does the size and shape of the beans affect their times to complete the run?
- Which bean(s) make it down the run the fastest? Which beans are the slowest? Why?
- What causes the beans to go faster or slower?
- What were the shapes and size of the fastest and slowest beans?

Extensions

- Gather other household items to race down the run.
- Design another run that will make the beans go quicker.
- Research systems that are designed to move things along a specific course, like roller coasters, conveyer belts, elevators, escalators, water pipes, etc. Try building one of them using household items.

Science behind the Activity

Friction is the force that slows objects down when they are rubbing against each other. Some things make lots of friction, like brakes on a bicycle, and some make very little friction, like skates on ice. We experience gravity as the constant force that pulls objects towards the ground, like beans sliding down the run.

Type of Bean	Predicted Time	Actual Time	Predicted Place	Actual Place
<i>Example: Lima Bean</i>	<i>35 seconds</i>	<i>17 seconds</i>	<i>1st Place</i>	<i>3rd Place</i>