**Ramp Design Challenge**

**Introduction**

You now understand the basics of the engineering design cycle. Apply what you know in order to solve a problem.

**Task**

For this activity, you need to design, build, and test a ramp that will allow a ball to roll a total distance of up to 2 meters. The starting point is the top of the ramp and the stopping point should be less than 2 meters from the top of the ramp.

**Materials**

You can use any reasonable materials to build your ramp. You will want to construct it on a flat surface that is larger than your ramp, such as a long table, the floor, or even a sidewalk. You may use any ball you have available that is a reasonable size for the task.

**Engineering Design Process**

Complete the steps of the engineering design process in the table below. The information on the left is a guide to help you get started with your responses. Be thorough in describing the process you follow to complete the design challenge.

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| **Define the Problem**  What is the problem you need to solve? | **WRITE YOUR RESPONSES HERE!** |
| **Do Background Research**  How can you get the ball to stop at a certain distance? Is the angle of the ramp significant? Are forces such as friction important in choosing your materials? What other questions do you need to answer before moving forward? |  |
| **Specify Requirements**  What criteria exist for your design, based on what the ramp needs to do? |  |
| **Brainstorm, Evaluate, and Choose Solution**  Imagine several possible solutions to your problem and sketch out some designs. Include a materials list with each design. Choose the solution that you think is most likely to help you solve the problem, and list your reasons why. Attach a drawing or computer-generated image of your solution. Be specific: give materials, measurements, and rationale. |  |
| **Build a Prototype**  Gather your materials and build your prototype. Describe your prototype in writing, including the process you took to build it. If possible, take a picture of your ramp and add to your saved work. |  |
| **Test Solution**  Try the ramp prototype you built. Position the ball at the top of the ramp and let it roll down. Does it stop within two meters from the top of the ramp? If so, describe your testing and move to the last step. If not, move to the redesign step next. |  |
| **Redesign and Test as Needed**  If your ramp failed the test of allowing the ball to stop within a 2-meter distance, redesign your ramp and test again. Be descriptive of the redesign and indicate if you chose to modify your current prototype or start completely over with another design. |  |
| **Communicate Results**  Share a brief summary of your process and results. What materials and design led you to the most favorable outcome? |  |