Problem Situation
Many products exist that can be improved. Indeed, technological innovation is often the result of improving on the works of others. Automotive engineers have carefully improved such areas as engine design and aerodynamics to achieve better performance and gas mileage. In this problem situation, the power source for a small toy car is a mousetrap. It is a simple idea with lots of room for improvement.

Your Challenge
You and your teammates are to redesign a mousetrap car so that it will travel the greatest distance possible.

Go to your Student Activity Guide, Design Activity 30. Complete the activity in your Guide, and state the design challenge in your own words.

1 Clarify the Design Specifications and Constraints
To solve the problem, your design must meet the following specifications and constraints:

• The mousetrap car must travel the greatest distance possible.
• The distance is to be measured in a straight line from start to finish. (If the car goes in a circle and ends up where it started, the distance traveled is zero feet.)
• The mousetrap must have a release mechanism to hold the arm in place before starting.
• The lever arm on the mousetrap can be no longer than 10".

In your Guide, state the specifications and constraints. Add any others that your team or your teacher included.

2 Research and Investigate
To better complete the design challenge, you need to first gather information to help you build a knowledge base.
In your Guide, complete the following Knowledge and Skill Builders:
1: Force and Distance
2: Friction
3: Big Wheels

3 **Generate Alternative Designs**
In your Guide, describe two possible solutions that your team has created for the problem. You will want to consider the size of the wheels, the length of the lever arm, additional weights, additional length, and frictional effects.

4 **Choose and Justify the Optimal Solution**
Refer to your Guide. Explain why you selected the solution you did, and why it was the better choice.

5 **Develop a Prototype**
Construct your redesigned mousetrap car. Include a scale drawing of your final design that shows the size and location of the wheels, arm, mousetrap, and body. You may also include a photograph of the car.
In your Guide, indicate which technological resources were most important in this activity, and how you made trade-offs among them.

6 **Test and Evaluate**
How will you test and evaluate your design? In your Guide, describe the testing procedure you will use. Explain how the results show that the design solves the problem and meets the specifications and constraints.

7 **Redesign the Solution**
Respond to the questions in your Guide about how you would redesign your solution. Your redesign should be based on the knowledge and information that you gained during the activity.

8 **Communicate Your Achievements**
In your Guide, describe the plan you will use to present your solution to the class. Show any handouts and/or PowerPoint slides you will use.