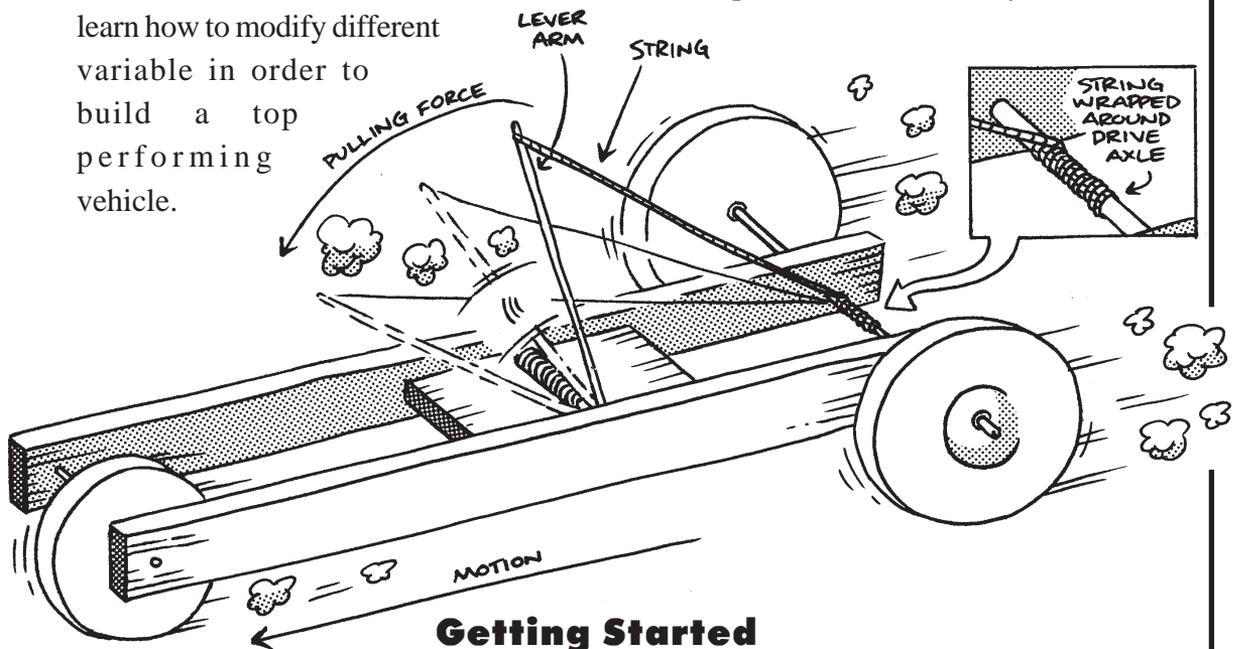
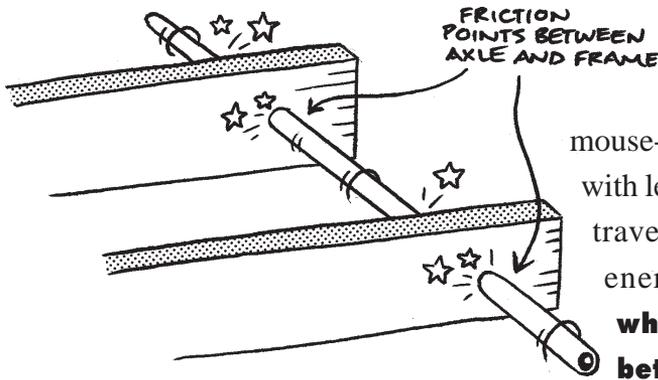


What is a Mouse-Trap Car and How does it Work?

A mouse-trap car is a vehicle that is powered by the energy that can be stored in a wound up mouse-trap spring. The most basic design is as follows: a string is attached to a mouse-trap's lever arm and then the string is wound around a drive axle causing the mouse-trap's spring to be under tension. Once the mouse-trap's arm is released, the tension of the mouse-trap's arm pulls the string off the drive axle causing the drive axle and the wheels to rotate, propelling the vehicle. This most basic design can propel a vehicle several meters for any first-time builder. But in order to build vehicles that can travel over **100 meters** or extreme speed cars that can travel **5 meters in less than a second**, you must learn about some of the different variables that affect the performance of a mouse-trap car. For example, how does friction affect the overall distance that a vehicle can travel? How does the length of the mouse-trap's lever arm affect the performance? By reading each section you will learn about many of the different variables that will affect a vehicle's performance. Also you will learn how to modify different variable in order to build a top performing vehicle.



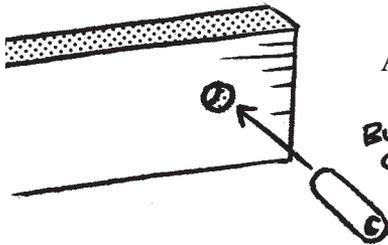
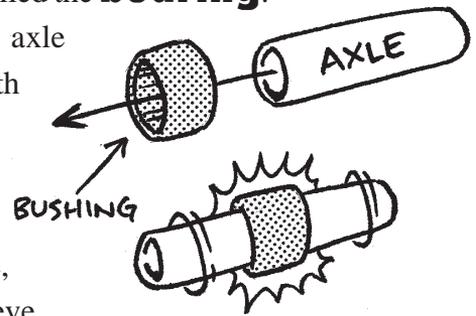
Getting Started



Minimizing surface friction on a mouse-trap car allows its wheels to spin with less resistance, resulting in a car that travels faster, farther and wastes less energy. **The most common area where surface friction will occur is between the axle and the chassis.**

The interface between the axle and the chassis is called the **bearing**.

A **plain bearing** can be as simple as an axle turning in a drilled hole. A **bushing** is a smooth sleeve placed in a hole that gives the axle a smoother rubbing surface, which means less surface friction. Some combinations of material should not be used because they do not help the cause; for example, avoid using aluminum as the axle or a bearing sleeve.



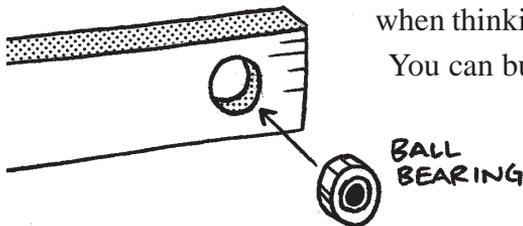
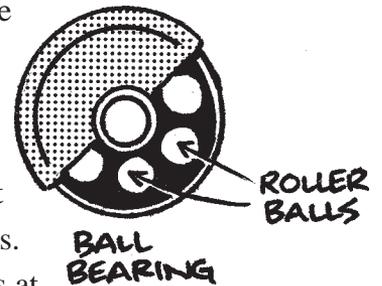
A **ball bearing** is a set of balls in the hole which is arranged so that the axle rolls on the balls instead of sliding in a sleeve. A rolling ball has very little

friction; therefore, ball bearings usually provide the best performance. Ball bearings have the least friction, but they are the most expensive, so you must evaluate your budget

when thinking about ball bearings.

You can buy small ball bearings at

a local hobby store that deals with remote-controlled vehicles.

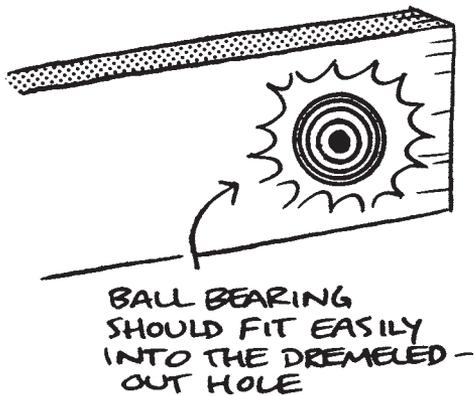
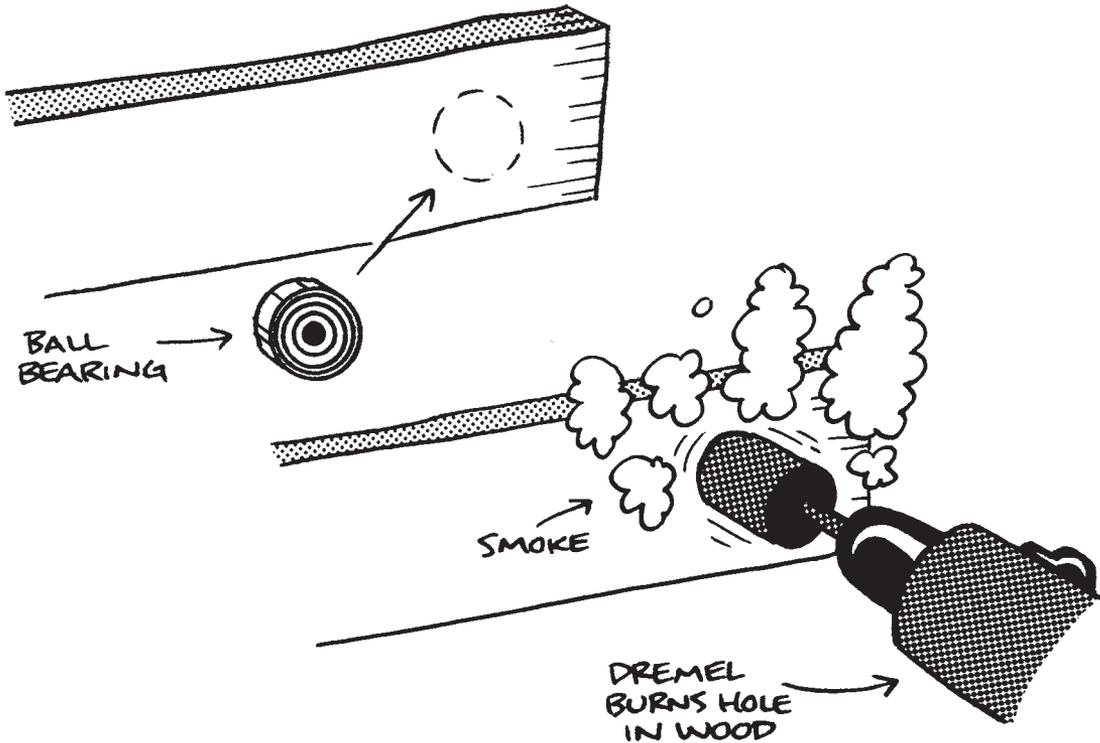


Friction

Construction Tip



Mounting a Ball Bearing



If you do not have a dremel tool, you can use a **drill** bit that matches the size of the bearing. Be careful since large drill bits can tear up the wooden causing the wood to **splinter**. Wrap a piece of tape around the area to be drilled in order to help protect the wood from **splintering**. Try drilling a small pilot hole with a smaller drill bit first.

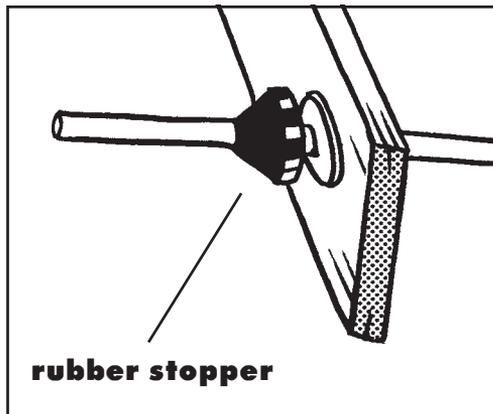
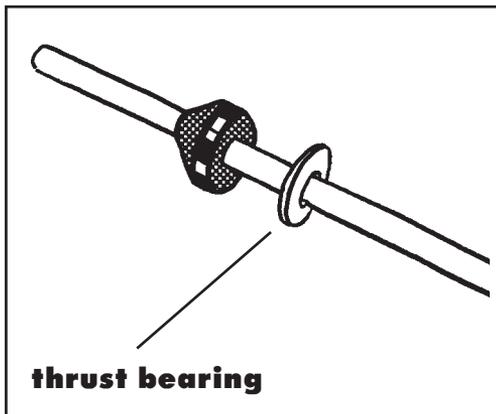
Friction

Construction Tip

Thrust Washers

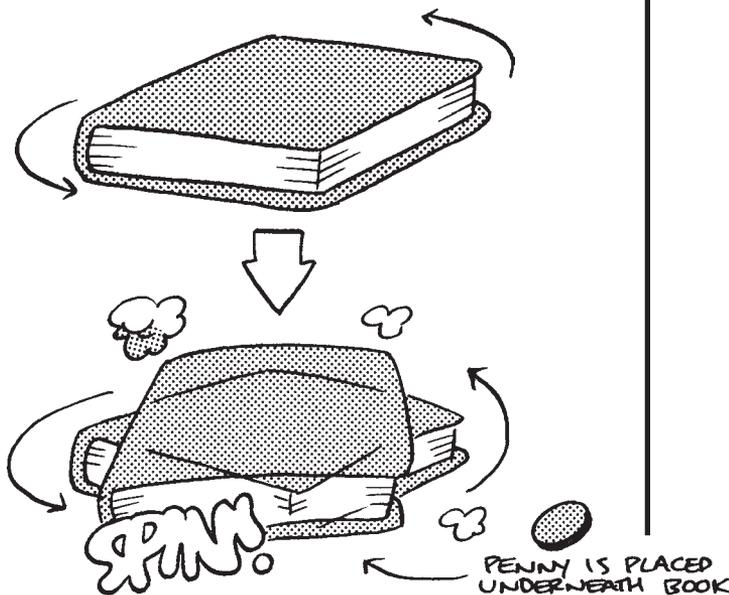


Thrust washers can be used to eliminate the rubbing friction of a wheel touching the frame. If a wheel has a side-to-side movement and touches the frame, a metal washer can be used to prevent the wheel from directly touching the frame, which will cause poor performance of your vehicle. In these pictures, a rubber stopper is placed on the axle to help eliminate the side-to-side movement and then a metal washer is placed between the frame and the stopper.



Experiment

Try an experiment to learn about a **thrust bearing**. Place a book on the table and give it a spin. The book should spin slowly and then stop quickly. Now place a coin underneath the book and give it a spin again. The book should spin for a considerably longer time before stopping.



Friction