**Mousetrap Car building basics**

A mousetrap-powered car is a vehicle that is powered by the energy of a wound-up mouse trap's spring. The most basic design is to tie one end of a string to the tip of a mousetrap's snapper arm and then the other end of the string has a loop that is designed to "catch" a hook that is glued to a drive axle. Once the loop is placed over the axle hook, the string is wound around the drive axle by turning the wheels in the opposite direction to the vehicle intended motion. As the string is wound around the axle by the turning of the wheels, the snapper's lever arm is pulled closer to the drive axle causing the mousetrap's spring to "wind-up" and store energy. When the drive wheels are released, the string is pulled off the drive axle by the mousetrap causing the wheels to rotate.

Step #1:

A string is attached to the mousetrap's lever arm and then hooked to the drive axle. The string has a loop knot tied at one end that is designed to "catch" a hook attached to the drive axle. The string's loop knot is designed so that the string can release itself after the pulling force is spent. If the axle's hook is too long or the string's loop knot is too tight, the string will not properly release from the axle causing the vehicle to suddenly stop.

Step #2:

To wind the string around the axle, the wheels are turned in the direction opposite to the motion of the vehicle's travel. It is important that the string NOT be wound loosely or it will snag itself as it is pulled from the axle by the lever arm, the string should carefully be wound tight and uniform around the axle. Do not push on the mousetrap's lever arm during this process; you want the string to be tight and to pull the lever arm over.

Step #3:

Once the car is released, the string is pulled off the axle causes the wheels to rotate propelling the vehicle. If the mousetrap is located to close to the drive axle the wheels can spin at the start wasting energy.

How to Build a “Speed” Mousetrap Car

When you build a vehicle for speed, you want to release the mousetrap's energy very quickly. This way your vehicle can get to top speed as soon as possible. You can change this by changing by changing the length of your arm, or the size of your wheels.

Greater acceleration can be achieved by: using a short length lever arm, having a small axle to large wheel ratio, build a light-weight vehicle. In addition, take into consideration the friction within the vehicle, and also the friction between the vehicle and the ground.

Short Arm vs. Long Arm

Short lever arms increase the pulling force over a shorter pulling distance thereby increasing the acceleration quickly. If the arm it too short, it may create too much accelerate and cause the wheels to begin to spin-out on the floor.

Long lever arms increase the time it takes to accelerate the car. This will result in a slower acceleration, but ensure a far distance is traveled by the car.

Big Wheels vs. Small Wheels

Larger wheels have a larger circumference, therefore cover a longer distance with each turn. This car will be able to travel long distances, but it takes a longer amount of time to create one wheel turn. This means that your car might travel at a slower pace.

Small wheels have a smaller circumference so each wheel turn will have a smaller distance. The cars will not travel as far, but they can cover a short distance very quickly.

Different Types of Friction

Friction is the resistance of motion between two objects. Most friction between the materials in your car reduce the amount of energy that is used to move the car, so it would make sense that you want to reduce the friction in between all the moving parts of your car. However, you actually rely on the friction between your wheels and the floor to help your car move. The wheels must be rigid and thin to minimize rolling resistance with the floor. But the drive wheels must additionally provide enough traction so that they don't slip when the car is accelerating. The car must be designed precisely in order to minimize the friction within the vehicle, and maximize the friction outside the vehicle so the tires “grab” the ground better, to get to top speeds faster.

Another, less thought of, friction involved in the performance of your car is air resistance. Remember, air resistance acts against the motion of the car and therefore should be reduced to increase performance.

 List Materials you want to use for your car:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_