**Task 8 – Constructing an Energy Efficient Vehicle from A Mousetrap**

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**What are the two types of friction that affect the performance of your vehicle?**

The friction that develops between the car's wheels and the ground it rolls on, as well as air resistance, are the two types of friction that have an impact on how well our vehicle performs.

**What problems related to friction did you encounter and how did you solve them?**

We were concerned that mounting the wheels to an axle with a stopper on the end to keep them from coming off the axle would cause too much friction between the ground and the wheels. We secured the wheels and axle using hot glue to stop this from happening. As a result, the front and rear axles spun along with the wheels. The car would not have moved because the string-lever attachment was linked to the axles in the first place if the wheels had not been glued to the axle.

**What factors did you consider, to decide the number of wheels you chose in your design?**

We decided to use four wheels since we wanted our design to be readily balanced and closely mimic a real car.

**What kind of wheels did you use in each axle? What is the effect of using large or small wheels?**

We had 2 large CDs attached to each axle. The larger wheels have a larger diameter therefore they have a greater travel distance with each turn compared to the smaller diameter wheels.

**Explain how Newton’s first, second, and third laws apply to the performance of your vehicle?**

Newton's first law applies to how well our car performs because it has inertia and will naturally tend to either stay at rest or to stay in motion while in motion. We must exploit inertia to our advantage by keeping the car moving in order to cover the furthest distance.

Newton's second law, which states that acceleration is inversely proportional to mass but directly proportional to nett force, governs how well our car performs. In order for our vehicle to have accelerated to its maximum speed, the mousetrap lever-string system must provide the largest amount of force while the car as a whole must have the least amount of mass.

Since it defines the interplay of forces between an object and the surface it must travel, Newton's third law is pertinent to the operation of our vehicle. The third rule of Newton indicates that there is an equal and opposite reaction to every action, and this is what happens when the wheels of an automobile push against a surface and the surface pushes back on the wheels. On whichever surface it is placed upon, gravity and normal force keep the vehicle going forwards while friction works in the other way.

**Discuss the effect of the length of the lever arm in the pulling force of your vehicle.**

A longer lever arm requires less pulling force to advance the vehicle since the force must travel a shorter distance from the released hammer to the axle. A shorter lever arm, on the other hand, generates more pulling force, which propels the vehicle forwards because the force's path from the released hammer to the axle is short.

**Discuss the types of energy transformations that occur in your car.**

The spring in the mousetrap serves as a reservoir for potential energy. Kinetic energy is created from potential energy. When the automobile is wound up and then let go, this occurs. This is where the potential energy occurs when it is coiled up. When that is released, the car moves, converting the potential energy into kinetic energy. The energy transforms into heat energy once the car has stopped.

**List the energy types that are wasted in your car.**

In our car, heat energy was wasted. This is due to the fact that softer wheels require less energy than harsher wheels. Our mousetrap car's wheels are quite rough in texture because we used CDs as them. More energy will be lost as a result.

**Discuss how you increased the efficiency of your vehicle (reduced the wasted output energy).**

The wheels we used were thin, but they were also hard. This means that even if some heat energy was lost, if the wheels had been thicker, there would have been a lot more heat energy that would have been lost, due to the fact that the wheels were thin so there wasn’t that much energy being wasted because they are lighter.