

Design a Balloon Car

Learning Objectives

Obj 1. Understand Newton's Third Law (For every action, there is an equal and opposite...)

"A force is a push or a pull that acts upon an object as a result of its interaction with another object. Forces result from interactions! Some forces result from contact interactions (normal, frictional, tensional, and applied forces are examples of contact forces) and other forces are the result of action-at-a-distance interactions (gravitational, electrical, and magnetic forces). According to Newton, whenever objects A and B interact with each other, they exert forces upon each other. When you sit in your chair, your body exerts a downward force on the chair and the chair exerts an upward force on your body. There are two forces resulting from this interaction - a force on the chair and a force on your body. These two forces are called action and reaction forces and are the subject of Newton's third law of motion. Formally stated, Newton's third law is:

For every action, there is an equal and opposite reaction.

The statement means that in every interaction, there is a pair of forces acting on the two interacting objects. The size of the forces on the first object equals the size of the force on the second object. The direction of the force on the first object is opposite to the direction of the force on the second object. Forces always come in pairs - equal and opposite action-reaction force pairs." - excerpt from [Physical Classroom](#).

Obj 2. Understand conservation of energy

"The first thing we need to note is that the law of conservation of energy is completely different from energy conservation. Energy conservation means saving energy through such things as insulating your home or using public transportation; generally it saves you money and helps the planet. The conservation of energy has nothing to do with saving energy: it's all about where energy comes from and where it goes.

Write the law formally and it sounds like this:

In a closed system, the amount of energy is fixed. You can't create any more energy inside the system or destroy any of the energy that's already in there. But you can convert the energy you have from one form to another (and sometimes back again).

A "closed system" is a bit like a sealed box around whatever we're studying: no energy can leak into the box from the inside (or be introduced to the box from outside).

There are some even simpler, more familiar ways of stating the conservation of energy. "No pain, no gain" is a rough everyday equivalent: if you want something, you have to work for it. "There's no such thing as a free lunch" and "You don't get anything for free" are other examples."...excerpt from [Explain That Stuff](#).

Obj 3. Learn and understand basic skills for creating an object in Tinkercad.

Process

Identify a need or shortfall (the need in this assignment is assigned).

Analyze how to fill the need with a design

Create design/prototype

Print design/prototype

Analyze prototype

Refine design

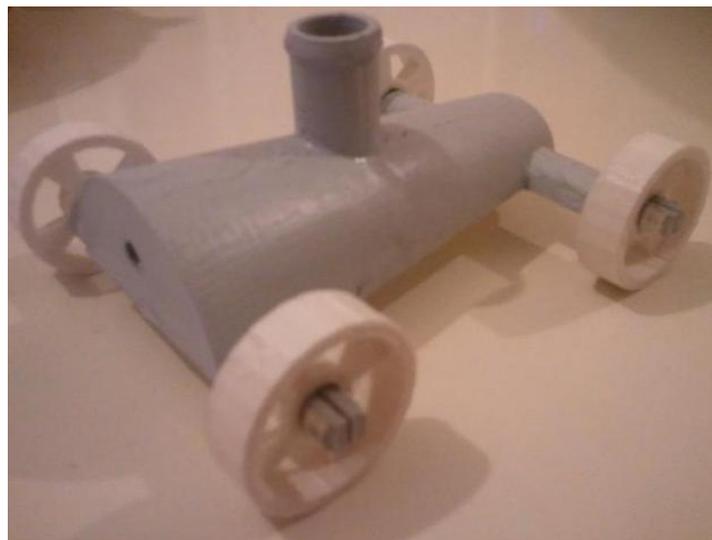
Reprint design

Apply design to penny and use

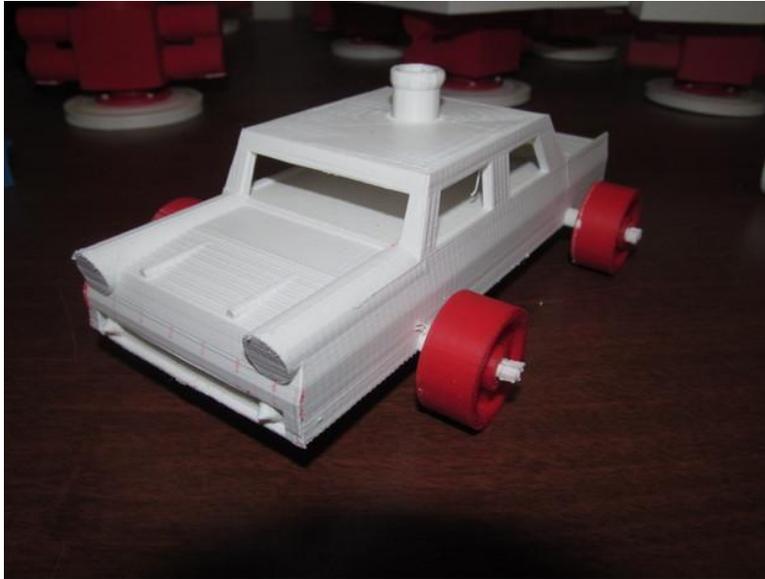
Cool things others have done on Thingiverse using Pennies



<http://www.thingiverse.com/thing:401845>

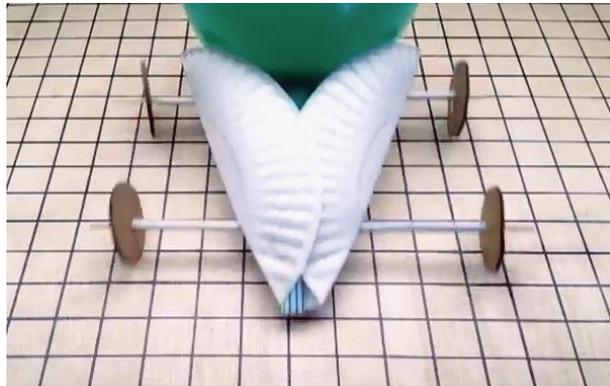


<http://www.thingiverse.com/thing:38053>



<http://www.thingiverse.com/thing:276992>

Other cool things from around the web!



Assessment

Allow students decide best design

Teacher decides best design

Best use of Tinkercad

Most creative (thoughtful) design

Most useful design

Have a classroom race for fastest car

Have a classroom competition to see who's car travels the farthest

Have students identify all forces at work with their car...friction, thrust, etc.