**Newton Scooters**

Imagine what would happen if you and a friend were standing on roller skates and you gave your friend a forward push. What would happen to you? Would you stand still or would you travel backward? The backward motion that you would experience can be explained by Newton’s third law of motion, which describes an equal and opposite reaction to every action.

In this project, you will use Newton’s third law of motion to design a vehicle. This vehicle must travel forward 1.5 meters by pushing backward on the floor, the air, or some other object. At the close of this project, you will demonstrate your vehicle and explain its features to the class.

**Criteria:** Design andbuild a vehicle that travels 1.5 meters.

**Constraints:**

■ Have your teacher approve your vehicle design plans before you begin construction of your vehicle.

■ Vehicle must use Newton’s third law of motion to move forward; it must move forward by pushing backward on the floor, the air, or some other object.

■ Build your vehicle from scrap materials. Don’t use a readymade vehicle.

■ Vehicle must travel forward 1.5 meters. The path of your vehicle should stay within a width of 1 meter. You must be able to demonstrate that your vehicle meets these criteria.

■ You are not allowed to interfere with the movement of your vehicle. You cannot give your vehicle a push as you launch it, and you cannot help it in any way as it travels from the starting line to the finish line.

■ You cannot use any form of electricity or the force of gravity to move your vehicle. (This means you cannot use a downhill ramp to get your vehicle started.)

■ You may use a “track” such as a toy car track or a string running from the starting line to the finish line to guide your vehicle.

■ Vehicle does not have to move along the ground.

**Suggested Materials**

Here are some ideas for materials to build your vehicle: recycled materials from home, toys or building-block sets, balloons, springs, straws, fishing line, paper towel rolls, rubber bands, empty boxes, etc.

**Project Hints**

■ Be creative! Don’t limit yourself to vehicles that have wheels. Think about other ways that you could get your vehicle to move a distance of 1.5 meters. The rules state that the vehicle has to stay within a width of 1 meter, but it is allowed to leave the ground! Your vehicle does not have to move in the classroom. You can demonstrate your Newton Scooter outside or bring in a video recording to show the class.

**Tentative Project Timeline**

*The planning components of this project will be completed in class.*

*Vehicles will be constructed at home.*

Due Friday, 3/11/16

* 2-3Sketches of possible vehicles completed
* Forces of gravity and friction applied to sketches
* Newton’s third law applied to sketches
* Brainstorming questions answered in complete sentences

Due by the end of class Tuesday, 3/15/16

* One detailed sketch chosen as design for vehicle (including measurements)
* List of materials needed for construction
* Table of variables that will affect the movement of vehicle and ways to improve vehicle

Due Monday, 3/28/16

* Vehicle construction completed (at home)

Due Thursday, 3/31/16

* All improvements completed
* Class presentation or video, with finished vehicle & labeled diagram