WHEELED VEHICLE
DESIGN PROJECT

Objective: Design and build a wheeled vehicle that will efficiently change potential energy to kinetic energy, be streamlined, and have minimum drag and friction.

Scientific Base: Newton's Laws of Motion

Rules:
1. Maximum weight for vehicle is 200 grams. The vehicle cannot be longer than, 30 cm or wider than 20 centimeters.
2. Vehicle must have neither power source nor energy storage system.
3. The vehicle must be designed and constructed entirely by the student.
4. Only wheels and an axle system may be purchased or be obtained by recycling an old toy vehicle.

Testing:

Prior to testing their vehicles students must have their vehicle's length, width, and weight measured by student judges. If the vehicle exceeds the maximum measurements they have one opportunity to change their vehicle and have it re-measured. The efficiency of the vehicle will be tested by rolling it down a ramp that is 60 cm long, 30 cm wide, and rising 5 cm off the floor at the high end. No pushing will be allowed. It is a simple release start. Any pushing will result in disqualification. Students (starters) will be in charge of controlling the start and others will be responsible for measuring, in centimeters, the distance traveled. Distances will be determined by measuring how far beyond the end of the ramp the vehicle travels minus the distance the vehicle veers from a straight course. The course will be laid out across the classroom floor marked out by wide tape. The course should be about 1 ½ meters wide and the length of the classroom. Other students will record each distance traveled per vehicle. Each vehicle will be given 3 attempts. The vehicle's performance (and student's grade) will be determined by the average of their 3 attempts. (Stress measurement in metric system).

Suggested materials include: papier-mâché, cardboard, toothpicks, empty milk containers, or other empty containers. Wheels can be constructed out

of CDs, cardboard, or any other material. NO FLYWHEELS ARE ALLOWED.

THINK: Streamline Friction Mass Drag Air Resistance

Some outcomes: Students soon learned that a vehicle doesn't have to look like an automobile nor does it have to have four wheels. They learned that streamlining can minimize drag and air resistance. Friction can be altered by changing the finish on the wheels, changing the shape of the wheel or redistributing the weight of the vehicle. They also came to realize that in converting potential energy to kinetic energy the heavier vehicle converts more of the potential energy to speed. However by adding weight they might also increase drag and air resistance. It's a matter of making trade-offs. In addition students had "hands-on" experience in using the metric system and metric tools such as the meter stick and the balance beam scale.

*Thought problem: What frictional forces will SuitSat 2 encounter when she is nudged out of the ISS?_____

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*Worth 10 Bonus Points!