Soda bottle rocket

Science, Physics

Soda bottle rocket Purpose The students will investigate the effect of the rocket length upon the distance of flight. The students will also investigate the mass upon the distance flight. Background The students will proof Newton's third law of motion states that for every action there is an equal and opposite reaction. Newton's third law also applies to rockets. A rocket gets its lift from the gases pushing out of its tail. The force of the rocket pushing on these gases is the action force. The gases exert an equal but opposite force on the rocket, which forces the rocket up, this is called the reaction force. According to the original guide sheet, the two items NASA will be evaluating the rocket on will be distance flown and time aloft. A two liter bottle with a cone and fins. The time is measured by seconds that the bottle flays, starting when it lives from the launch pad until it rites the ground. The distance is how far it flew. The motion will be projectile. The average velocity will be the total distance of rocket sting measured. The average speed will be the total distance of rocket flight measured in meters and total amount of time aloft measured in seconds. The altitude will be measured by an altimeter. The acceleration will speed up and change direction. The force can be the gravity. The kinetic energy will be the mass and velocity. The potential energy on the launch pad. Newton's first law is about the state of motion of an object does not charge as long as the net force acting on the object is zero. His second law is about the acceleration of an object is equal to the net force acting on it divided by the object's mass. Newton's third law is whenever one object exerts a force on a second object, the second object exerts an equal and opposite force on the first object. The momentum is mass Ã— velocity. The kinetic energy is the mass Ã— velocity. Momentum is

a property of any moving object. For a slow moving object it is given by the mass times the velocity of the object. For an object moving at close to the speed of light this definition gets modified. The total momentum is a conserved quantity in any process. Weight is the vertical force exerted by a mass as a result of gravity. Mass is the property of a body that causes it to have weight in a gravitational field. The centripetal acceleration considers an object moving in a circle of radius r with constant angular velocity. The tangential speed is constant, but the direction of the tangential velocity vector changes as the object rotates. Average speed is if you were to plot an object's position versus time, slope of that graph would be the object's speed. The average speed over some interval is given by the change in position divided by the change in time. This is different from the instantaneous speed, which is simply the position at a single point divided by the time it took to arrive at that position average. Average velocity is the total displacement divided by elapsed time. Average acceleration is the ratio of change in velocity over time elapsed. The kinetic energy is the energy of motion; the energy an object has as result of its motion. Hypothesis One hypothesis of the soda rocket experiment is if the mass of rocket is heavier it should fly for less time. The second hypothesis is if the length is longer it can fly for a longer time. Independent and Dependent variables The independent variables are the mass and length of rocket. The dependent variable is the time aloft. Materials list The materials used to construct the rocket are… > Duct tape > A two liter soda bottle > Paper (for the fins and cone) The materials to measure the rocket are… > The balance > Calculator > Ruler The materials used in the launch day are… > Water > Timer > Altitude

calculator > Metric measure tape > Air compressor > A bottle rocket launcher The procedure to construct the rocket is… 1. Cut the top from one of the bottles and connect together with the second. 2. Do a paper cone to put on the top of the rocket. 3. Put duct tape all the way around the rocket. 4. Do the fins and glue them with duct tape in the borrow. 5. Decorate. The procedure to the Data collection is… 6. Make the measurements from your rocket. Length (cm), width from side to side, and Mass (g) 7. Put the exactly milliliters of water. 8. Put in the soda rocket launcher. 9. Measure the time with the timer; beginning when is launched until it rites the ground. The procedure from the launch day… 10. Find the distance with the metric measurement tape. 11. Finish your data table lab report. Your rocket should look like with this: Analysis The correction for mass vs. distance flown is -. 0208, which means the relationship between mass and distance is weak. The mass has little effect on distance flown. The relationship is negative or indirect.