

Write one important fact from each paragraph in this space.

## Science Shorts -8

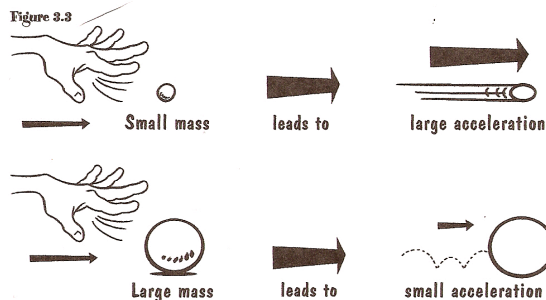
### Newton's Three Laws

Isaac Newton discovered the three basic laws of motion in the late 1600's. The first of Newton's three laws states that an object at rest will stay at rest and an object in motion will stay in motion unless acted upon by a force. In our experiments we placed a car with a penny on top at the top of a ramp. Both the car and the penny were at rest. When the car starts moving down the ramp BOTH the car and the penny are in motion. When the car is stopped by the force of the book the force of the book did not stop the penny and it stays in motion. The penny stays in motion until the force of gravity pulls it down far enough to touch the book and then the force of friction stops the penny.

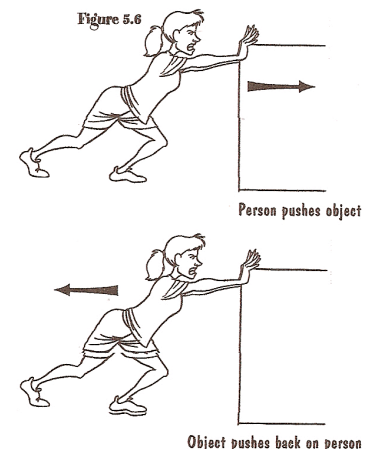
When you are riding in a car going 60 mph both you and the car are going 60 mph. If the car stops suddenly and you do not have a seat belt around you, you will continue in motion at 60 mph until you hit the back of the front seat or go flying through the windshield and hit the hood of the car where friction will cause you to stop. Remember objects in motion want to stay in motion!

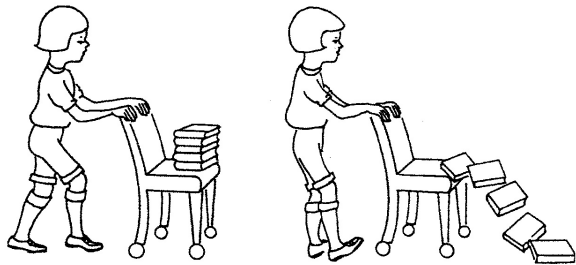
Newton's second law states that the acceleration of an object depends on its mass and the size of the force acting on it. What that means is if you apply an equal force to two objects, the one with the smaller mass will accelerate more. So, if you want to increase acceleration, you must

decrease the mass. If you want to decrease acceleration, you must increase the mass.



Newton's third law states that for every action there is an equal and opposite reaction force. What that means is that when you push an object, it pushes back with an equal force and that force is in the exact opposite from your push. So, if you push with a force of 25 N, whatever object you are pushing is pushing back with 25 N. This is sometimes called action-reaction.



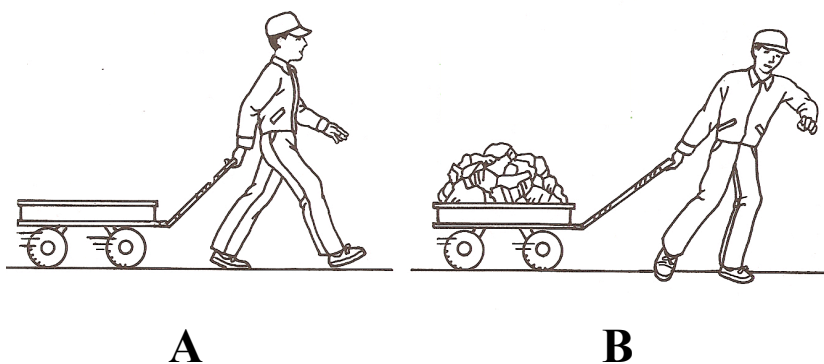


The girl is pushing the chair with the books on it. When she suddenly stops the books fall off.

1. What is this illustrating?
  - a. Newton's 1<sup>st</sup> Law
  - b. Newton's 2<sup>nd</sup> Law
  - c. Newton's 3<sup>rd</sup> Law
2. While the chair is rolling what things are in motion?
  - a. only the chair
  - b. only the girl
  - c. only the books
  - d. the girl, the chair and the books

One man is pulling an empty wagon while the other man is pulling a heavy wagon. The man with the empty wagon can have a larger acceleration than the man with the heavier wagon.

3. What is this illustrating?
  - a. Newton's 1<sup>st</sup> Law
  - b. Newton's 2<sup>nd</sup> Law
  - c. Newton's 3<sup>rd</sup> Law
4. What would the man in picture B have to do to be able to accelerate as fast the man in picture A?
  - a. increase the mass in the wagon
  - b. decrease the force he is exerting
  - c. decrease the mass in the wagon



The baseball has been thrown toward the player. If he hits the ball, it will go sailing away.



5. What is this illustrating?
  - a. Newton's 1<sup>st</sup> Law
  - b. Newton's 2<sup>nd</sup> Law
  - c. Newton's 3<sup>rd</sup> Law
6. If he hits the ball with a force of 15 N how much force does the ball exert on the bat?
  - a. 15 N
  - b. 10 N
  - c. 20 N
7. If he hits the ball in what direction will it go?
  - a. the same direction it was thrown
  - b. the opposite direction it was thrown
  - c. at a right angle