

SCIENCE 205 WORKSHEET
Newton's Laws of Motion

DIRECTIONS: On a separate sheet of paper, answer each of the questions as fully as possible to receive full credit. You may use your notes.

1. Why does a child in a wagon seem to fall backward when you give the wagon a sharp pull?
2. When a golf ball is dropped to the pavement, it bounces back up. (a) Is a force needed to make it bounce back up? (b) If so, what exerts the force?
3. Explain, using Newton's first and second laws, the motion of your leg during one stride while walking.
4. A person wearing a cast on an arm or leg experiences extra fatigue. Explain this using Newton's first and second laws.
5. If the acceleration of a body is zero, are no forces acting on it?
6. Why do you push harder on the pedals of a bicycle when first starting out than when moving at constant speed?
7. Only one force acts on an object. Can the object have zero acceleration? Zero velocity?
8. When you are running and want to stop quickly, you must decelerate quickly. What is the origin of the force that causes you to stop?
9. Why might your foot hurt if you kick a heavy desk or a wall?
10. When you stand still on the ground, how large of a force does the ground apply to you? Why doesn't this force make you rise into the air?
11. A ball is held in a person's hand. (a) Identify all the external forces acting on the ball and the reaction force to each. (b) If the ball is dropped, what force is exerted on the ball while it is falling? Identify the reaction force in this case. (Neglect air resistance)
12. If a car is traveling westward with a constant speed of 20 m/s, what is the resultant (net) force acting on it?
13. If a car moves with constant acceleration, can you conclude that there are no forces acting on it?
14. If gold were sold by weight, would you rather buy it in Denver or Death Valley? If it were sold by mass, in which of the two locations would you prefer to buy it? Why?
15. A passenger sitting in the rear of a bus claims that she was injured as the driver slammed on the brakes, causing the suitcase to come flying toward her from the front of the bus. If you were the judge in this case, what decision would you make (agree or disagree)? Why?
16. A space explorer is moving through space far from any star or planet. She notices a large rock, taken as a specimen from an alien planet, floating around the cabin of the ship. Should she push it gently or kick it toward the storage compartment? Why?