

Name _____ Period _____ Date _____

Forces and the Laws of Motion
Conceptual Questions

1. Is it possible for an object to move if no net force is acting on it? Explain.
2. If an object is at rest, can we conclude that no external forces are acting on it?
3. A beach ball is left in the bed of a pickup truck. Describe what happens to the ball when the truck accelerates forward.
4. Earth is attracted to an object with a force equal to and opposite the force Earth exerts on the object. Is Earth's acceleration equal to and opposite that of the object? Why or why not?
5. The law of inertia states that no force is required to maintain motion. Why then do you have to keep pedaling your bicycle to maintain motion?
6. If you were in a spaceship and launched a cannonball into frictionless space, how much force would have to be exerted on the ball to keep it going?
7. What is the net force or, equivalently, the resultant force acting on an object in equilibrium?
8. Forces of 10 N and 15 N in the same direction act on an object. What is the net force on the object? Suppose the same forces acted in opposite directions. What is the net force acting on the object then?
9. If you were on the moon and dropped a hammer and a feather from the same elevation at the same time, would they strike the surface of the moon at the same instant?
10. If you push horizontally on your book with a force of 1 N to make the book slide at constant velocity, how much force is the force of friction on the book?

11. A car accelerates along a road. Strictly speaking, what is the force that moves the car?
12. We know the Earth pulls on the moon. Does the moon also pull on Earth? If so, which pull is stronger?
13. If you walk on a log that is floating in the water, the log moves backwards. Why?
14. Why is it easier to walk on a carpeted floor than a smooth polished floor?
15. What physical quantity is a measure of the amount of inertia an object has?
16. An object thrown into the air stops at the highest point in its path. Is it in equilibrium at this point? Explain.
17. A large crate is placed on the bed of a truck but is not tied down. As the truck accelerates forward, the crate slides across the bed until it hits the tailgate. Explain what causes this.
18. A space explorer is moving through space far from any planet or star and notices a large rock, taken as a specimen from an alien planet, floating around the cabin of the ship. Should the explorer push in gently or kick it toward the storage compartment? Why?
19. Imaging an astronaut in space at the midpoint between two stars of equal mass. If all other objects are infinitely far away, how much does the astronaut weigh? Explain your answer.
20. A sky diver falls through the air. As the speed of the sky diver increases, what happens to the sky diver's acceleration? What is the acceleration when the sky diver reaches terminal speed?