Unit #4: Newton's Laws of Motion Study Guide

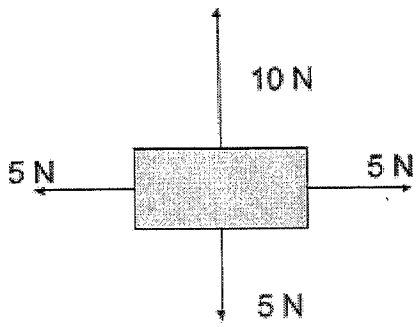
1. Know key science vocabulary word meanings: force, mass, acceleration, Newton's 1st Law, Newton's 2nd Law, Newton's 3rd Law, inertia, net force, normal force, free body diagram, action force, reaction force.
2. Be able to calculate acceleration, force, and mass in Newton's 2nd Law problems.

   $F = m \times a$ $\quad a = \frac{F}{m}$ $\quad m = \frac{F}{a}$

   What is the acceleration of a 50 kg block of cement that is pulled upwards with a force of 600 N?

   A truck has a mass of 2,000 kg and accelerates at a rate of 2 m/s². What is the magnitude of force that acts on the truck?

3. Determine the net force on an object when given force values.



4. Why is Newton's 1st Law of Motion also known as the law of inertia?
5. Why don't action and reaction forces cancel each other out?
6. In Newton's 2nd Law of Motion (a = F ÷ m), as mass increases what happens to acceleration?

7. _____ The tendency of an object to resist change in its motion is known as
   a. Mass
   b. Inertia
   c. Force
   d. balance

8. _____ A push or a pull is known as
   a. Acceleration
   b. Motion
   c. Inertia
   d. force

9. _____ According to Newton's third law of motion, when a hammer strikes and exerts force on a nail, the nail
   a. Creates a friction with the hammer.
   b. Disappears into the wood
   c. Exerts an equal force back on the hammer.
   d. Moves at a constant speed.

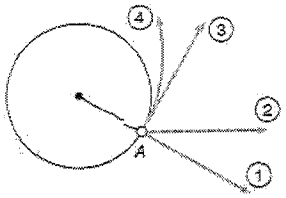
10. _____ Forces always occur
   a. When velocities are constant.
   b. As single quantities.
   c. In pairs.
   d. In triplets.

11. _____ One object has twice as much mass as another object. The first object also has twice as much
   a. Inertia.
   b. Velocity .
   c. Gravitational acceleration.
   d. Energy.

12. _____ A force of 100 N accelerates a mass of 1 kg at the rate of $1 m/s^2$. The acceleration of a mass of 2 kg acted upon by a force of 2 N is
   a. Half as much.
   b. Twice as much.
   c. The same.
   d. None of the above.

13. _____ If the force acting on a cart doubles, what happens to the cart's acceleration?
   a. It quadruples.
   b. It doubles.
   c. It halves.
   d. It quarters.

14. If an object is swung in a circle, and let go of, how does it travel from the point at which it was released? Which path would the ball take?



Q6 Diagram

15. Identify action and reaction forces in everyday situations.