

Newton's Laws of Motion

1 The Law of Inertia

With no net force acting upon it, an object at rest tends to stay at rest, and an object in motion tends to stay in motion. Both objects will continue with the same inertia, keeping the same velocity.

The ball will not move unless there is a force to cause it to move.



If a ball were rolling on a frictionless surface, it would keep moving unless met with an outside force.



2 The Law of Force = Mass x Acceleration ($F=ma$)

The acceleration of an object is dependent upon the net force acting upon the object and the mass of the object.

Because the mass of each ball is different, each ball will travel a different distance and at a different speed when it is hit with the same force.



WHACK!



THUMP!

3 The Law of Action & Reaction

For every action, there is an equal and opposite reaction.

When there is force by one side, there will be opposite and equal force by the other side, causing each side to move in opposite directions.



Which of Newton's Laws of Motion (1st, 2nd, or 3rd) best explains the following situations?

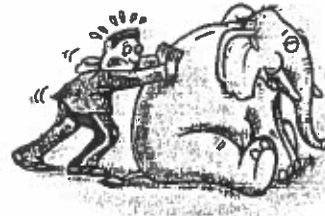
- _____ An empty grocery cart is easier to steer than a full grocery cart.
- _____ A tennis ball can be thrown farther than a bowling ball.
- _____ A sports car speeds up faster than a dumptruck when the light turns green.
- _____ Ketchup is removed from the bottle by shaking it downward, then quickly stopping it.



5. _____



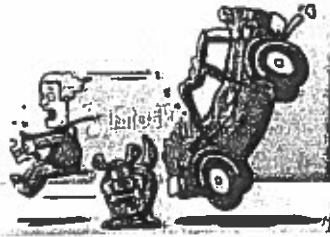
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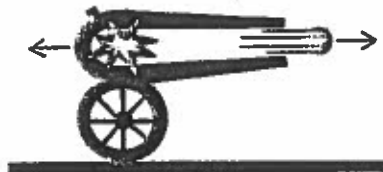
7. _____



8. _____



9. _____



10. _____

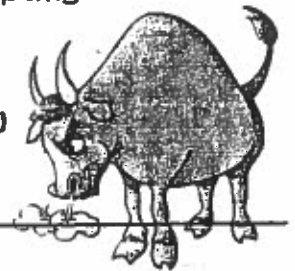


11. _____



12. _____

13. Ben Tooclose is being chased by a huge, angry bull, which he was attempting to photograph. The enormous mass of the bull is extremely intimidating. Yet, if Ben runs in a zigzag pattern he will be able to use the large mass of the bull to his own advantage. Explain this in terms of Newton's 1st Law of Motion (inertia).



14. How much force is needed to accelerate a 500kg car at a rate of 6 m/s²?

15. Which of the following represent balanced forces? Remember, the net force must = 0.

