Lesson Plan

Academic Subjects: Physics

Academic Topics: Physical science, Newton's Three Laws of Motion

Background: In this segment we use hockey to introduce Newtor three laws of motion

Discussion: Newton's first law: If a body is at rest, it will remain rest. If it is moving at a constant velocity, it will continue to do so until a forc acts on it. A hockey player is an excellent example of Newton's first law. If h stands still, he won't move. If something, or someone, hits him, or if he push against the ice, he'll move.

Conversely, if he's gliding on the ice, he'll continue to glide until the friction between his blades and the ice stops him.

Newton's second law: When a force acts on a body, the body is accelerated b an amount which is directly proportional to the force applied and inversely proportional to the mass of the body.

In other words, if a player strikes a puck, its acceleration is determined by the mass of the puck and how hard the player hits it. If the puck were larger, it would accelerate less, and if the player hits harder, the puck accelerates more quickly.

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Newton's third law: For every force exerted by a body, an equal and opposite force is exerted on the body. When two hockey players collide, they are both with an equal force, even if one player is moving and the other is standing sti Even though the target player is standing still, he still exerts just as much for on the hitting player as the player is delivering to him.

Extending the Lesson:
- Challenge groups of students to develop nonverbal sk illustrating each of Newton's three laws of motion.
- Ask your students to identify examples of Newton's l in other sports.

Activities

How does Newton's third law allow a runner to run?

1

2 As a baseball flies through the air, it seems to slow down. According Newton's first law, this can't happen unless some force acts on the b Where does this force come from?

3 According to Newton's second law, a force applied to a heavy objec accelerate it less than it would accelerate a light object. Given this fa why can you throw a baseball much farther than you can throw a Wi ball?

Answer

1. Through friction, a runner exerts a force backwards on the ground. The gro then exerts an equal and opposite force on the runner, sending her forward.
2. The air exerts a drag force on the ball due to friction between the air and th ball.

3. Once a wiffle ball is in flight, friction between the ball and the air decelerat the ball much more quickly than the air can slow a baseball. (Consider the momentum difference, too!)