

Lesson 4: Newton's Third Law of Motion

Newton's Third Law

<http://www.physicsclassroom.com/class/newtlaws/Lesson-4/Newton-s-Third-Law>

Check Your Understanding

1. While driving down the road, a firefly strikes the windshield of a bus and makes a quite obvious mess in front of the face of the driver. This is a clear case of Newton's third law of motion. The firefly hit the bus and the bus hits the firefly. Which of the two forces is greater: the force on the firefly or the force on the bus?



2. For years, space travel was believed to be impossible because there was nothing which rockets could push off of in space in order to provide the propulsion necessary to accelerate. This inability of a rocket to provide propulsion is because ...

- a. ... space is void of air so the rockets have nothing to push off of.
- b. ... gravity is absent in space.
- c. ... space is void of air and so there is no air resistance in space.
- d. ... nonsense! Rockets do accelerate in space and have been able to do so for a long time.

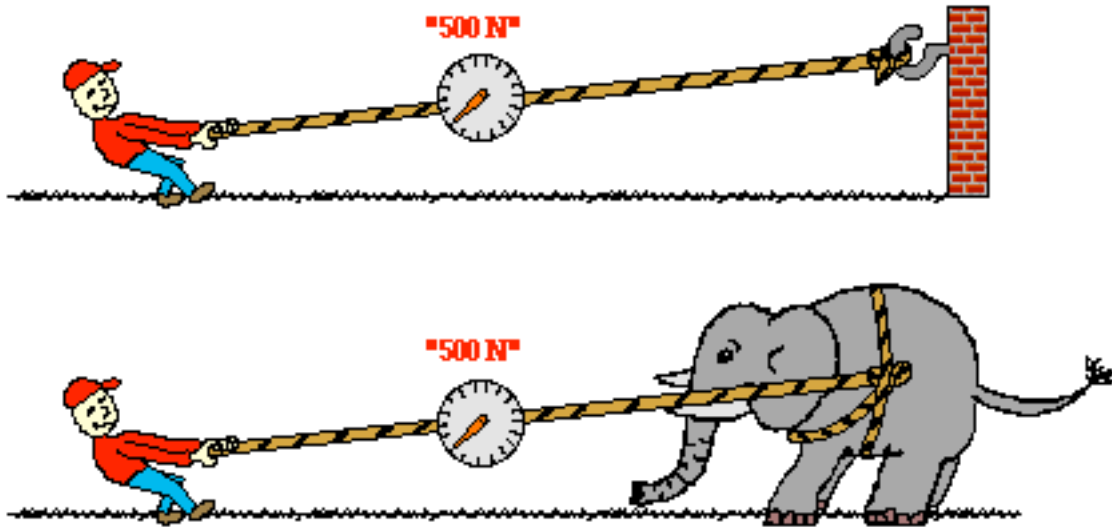
3. Many people are familiar with the fact that a rifle recoils when fired. This recoil is the result of action-reaction force pairs. A gunpowder explosion creates hot gases which expand outward allowing the rifle to push forward on the bullet. Consistent with Newton's third law of motion, the bullet pushes backwards upon the rifle. The acceleration of the recoiling rifle is ...



- a. greater than the acceleration of the bullet.
- b. smaller than the acceleration of the bullet.
- c. the same size as the acceleration of the bullet.

4. In the top picture (below), Kent Budgett is pulling upon a rope which is attached to a wall. In the bottom picture, the Kent is pulling upon a rope which is attached to an elephant. In each case, the force scale reads 500 Newtons. Kent is pulling ...

- a. with more force when the rope is attached to the wall.
- b. with more force when the rope is attached to the elephant.
- c. the same force in each case.



Identifying Action and Reaction Force Pairs

<http://www.physicsclassroom.com/class/newtlaws/Lesson-4/Identifying-Action-and-Reaction-Force-Pairs>

Consider the following three examples. One of the forces in the mutual interaction is described; describe the other force in the action-reaction force pair. Click the button to view the answer.

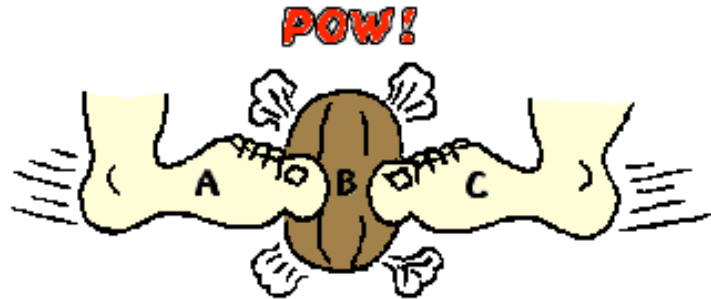
Baseball pushes glove leftwards.

Bowling ball pushes pin leftwards.

Enclosed air particles push balloon wall outwards.

Check Your Understanding

1. Consider the interaction depicted below between foot A, ball B, and foot C. The three objects interact simultaneously (at the same time). Identify the two pairs of action-reaction forces. Use the notation "foot A", "foot C", and "ball B" in your statements. Click the button to view the answer.



2. Identify at least six pairs of action-reaction force pairs in the following diagram.

