

Newton's 3rd Law

Action-Reaction

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Newton's Third Law

- ▶ *"Whenever one object exerts a force on a second object, the second object exerts an equal and opposite force on the first object."*
- ▶ *AKA: For every action, there is an equal and opposite reaction.*

Force Interactions

- ▶ Newton's Third Law describes interactions between forces.
- ▶ The action force and the reaction force happen in pairs.
- ▶ The action & reaction forces are **EQUAL** and **OPPOSITE** in direction

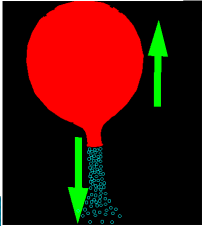

Action-Reaction

- ▶ Hammer hitting nail...
 - Action - *Hammer hits nail*
 - Reaction - *Nail halts hammer*
- ▶ Student jumping from canoe to dock...
 - Action -
 - Reaction -

Action - Reaction

- ▶ Action - *Air rushes out*
- ▶ Reaction - *balloon is pushed up*

- ▶ Action - *exhaust gases push down*
- ▶ Reaction - *rocket is pushed up*

Action Reaction

Action-Reaction

- ▶ Shooting a gun or cannon...

The top diagram shows a person on a skateboard. An arrow labeled 'Action' points to the right, and an arrow labeled 'Reaction' points to the left. The bottom diagram shows a cannon firing a shell. An arrow labeled 'Action' points to the right, and an arrow labeled 'Reaction' points to the left. A 'BAM!' sound effect is written above the cannon.

Action-Reaction

The top diagram shows a car moving to the right. Text below it reads: 'ACTION: TIRE PUSHES ROAD REACTION: ROAD PUSHES TIRE'. The bottom diagram shows a rocket launching upwards. Text below it reads: 'ACTION: ROCKET PUSHES GAS REACTION: GAS PUSHES ROCKET'.

The left diagram shows two objects, A and B, colliding. A 'BAM!' sound effect is written above them. The right diagram shows a ball on top of a tall tower. Text below it reads: 'ACTION: EARTH PULLS BALL' and 'REACTION: BALL PULLS EARTH'.

The top left diagram shows an airplane with blue arrows pointing backwards from its engines. Text above it reads: 'Hot gas expelled' and below it: 'Motion'. The top right diagram shows a horse pulling a cart. Blue arrows point backwards from the cart's wheels. The bottom right diagram shows a Newton's cradle with several balls in motion.

Newton's 3rd Law Demos

- ▶ Balloons
- ▶ Newton's Cradle
- ▶ Bowling Ball Toss