

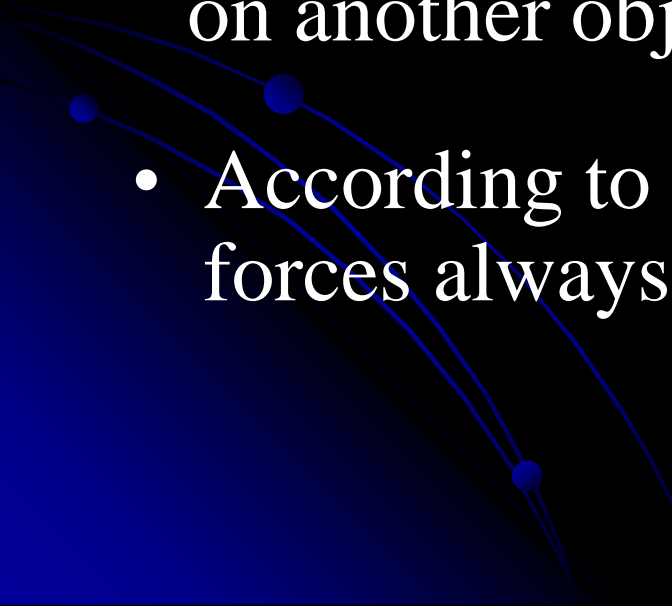
# Newton's Third Law of Motion

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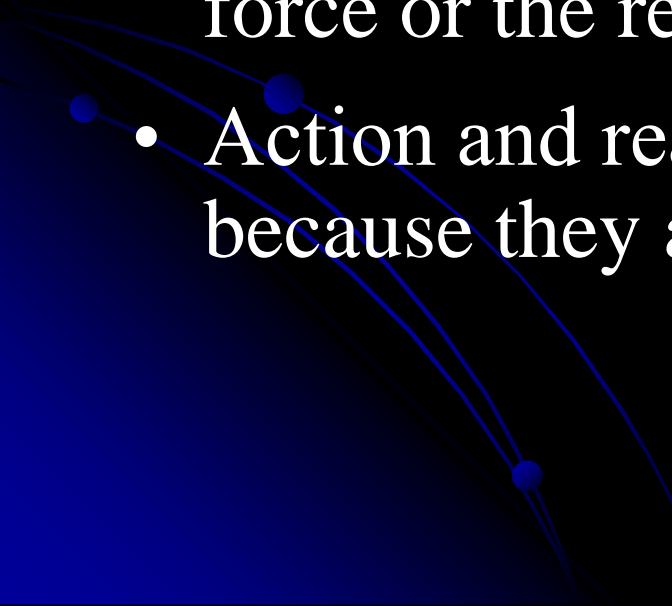
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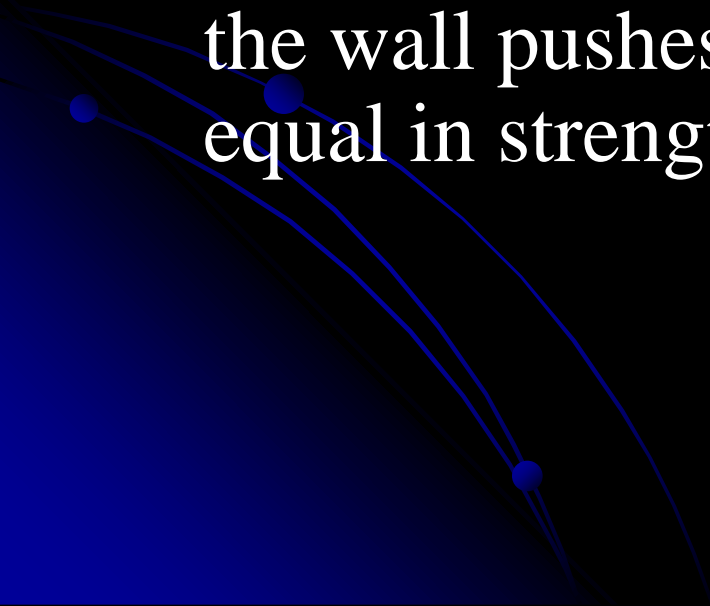
# Action - Reaction

- Newton's first two laws of motion explain how the motion of a single object changes.
  - Newton's **third law** describes something else that happens when one object exerts a **force** on another object.
  - According to **Newton's third law of motion**, forces always act in **equal** but **opposite** pairs.
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# Action - Reaction

- The forces exerted by **two objects** on each other are often called an **action-reaction force pair**.
  - Either force can be considered the action force or the reaction force.
  - Action and reaction force pairs don't cancel because they act on different objects.
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# Newton's Third Law

- Newton's Third Law of Motion **states: for every action, there is an equal but opposite reaction.**
  - This means that when you push on a wall, the wall pushes back on you with a force equal in strength to the force you exerted.
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# More Examples

- Think about the time you sit in a chair. Your body exerts a force downward and that chair needs to exert an equal force upward or the chair will collapse.
- There's also the example of shooting a cannonball. When the cannonball is fired through the air (by the explosion), the cannon is pushed backward. The force pushing the ball out was equal to the force pushing the cannon back, but the effect on the cannon is less noticeable because it has

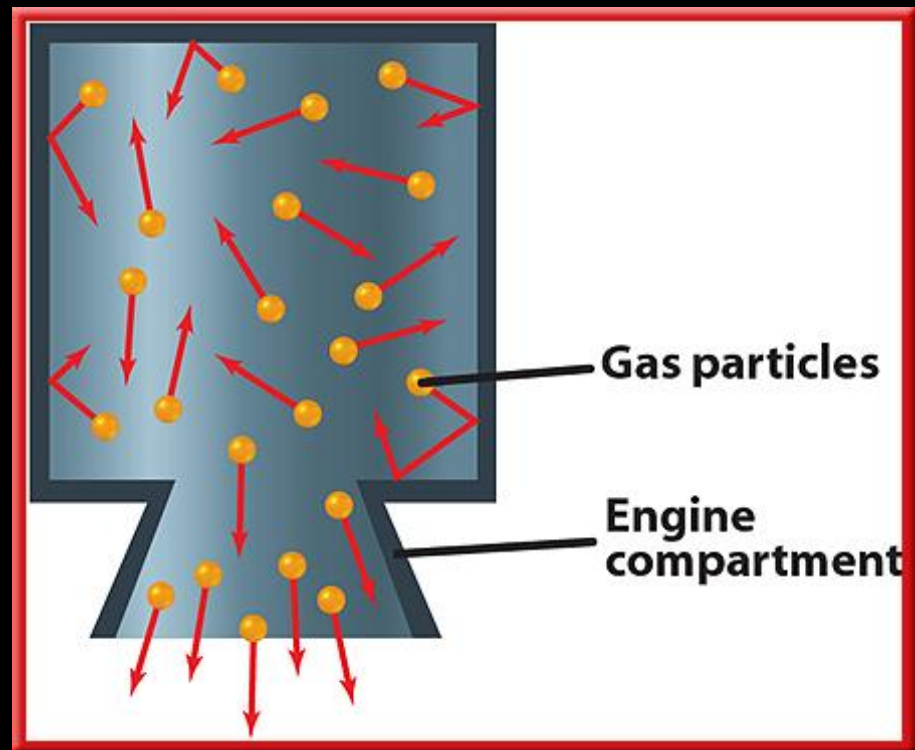
# Action - Reaction

- You constantly use action-reaction force pairs as you move about.
- When you jump, **you push down on the ground.**
- The **ground then pushes up on you.** It is this upward force that pushes you into the air.

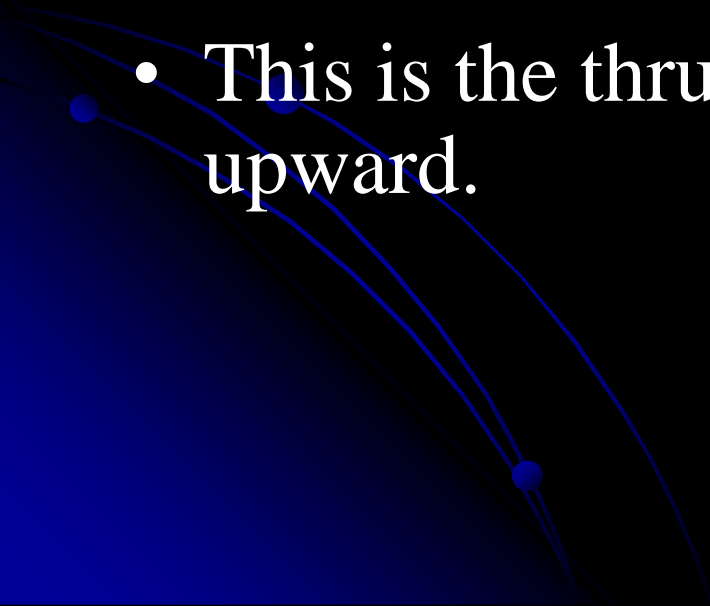


# Action - Reaction

- When the rocket fuel is ignited, a hot gas is produced.
- As the gas molecules collide with the inside engine walls, the walls exert a force that pushes them out of the bottom of the engine.



# Action - Reaction

- This downward push is the action force.
  - The reaction force is the upward push on the rocket engine by the gas molecules.
  - This is the thrust that propels the rocket upward.
- 



# Section Review

## Question 1

Explain Newton's third law of motion.

## Answer

The third law says that forces always act in equal but opposite pairs. For every action, there is an equal and opposite reaction.

# Section Review

## Question 2

If they are “equal but opposite,” why don’t action-reaction pairs cancel?

## Answer

Action-reaction pairs don’t cancel because they act on different objects, not on the same object. Equal and opposite forces acting on the same object would cancel.