

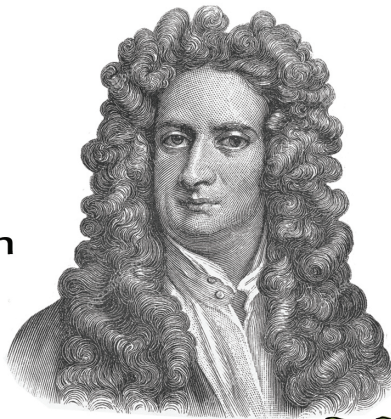
INERTIA CHALLENGE

DIRECTIONS



SUPPLIES

- 6 pennies
- clear glass of water
- index card or piece of thin cardboard
- a flat surface



KEY CONCEPTS

- GRAVITY
- NEWTON'S LAWS OF MOTION
- INERTIA

EXPERIMENT ONE

THE PENNY STACK

STEP 1

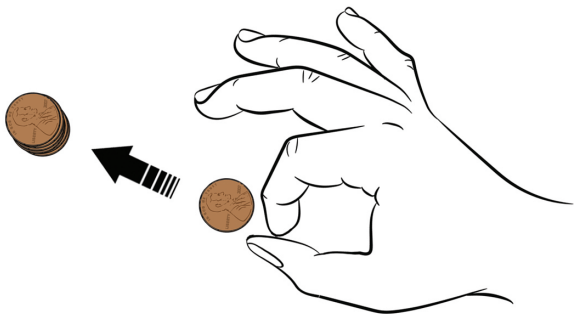
Set up: Stack all but one penny in a tower on a flat surface.

QUESTION

What do you think will happen if you flick one penny at the stack of pennies?

STEP 2

Place the one remaining penny on the same surface 3-6 inches from the tower. Aiming for the bottom of the tower, flick that penny toward the stack. Give it a good, forceful flick.



QUESTIONS

- Did the stack fall over when the penny hit the stack?
- Why did the pennies react this way?

EXPERIMENT TWO

THE PENNY DUNK

STEP 1

Set up: Place an index card on top of a glass of water. In the center of the index card, place the stack of pennies.

QUESTION

What do you think will happen if you flick the index card?

STEP 2

Give the index card a good flick.



*It might take a few tries to flick the index card just right.

QUESTIONS

- Did the pennies fly off with the index card?
- Why did the pennies react this way?

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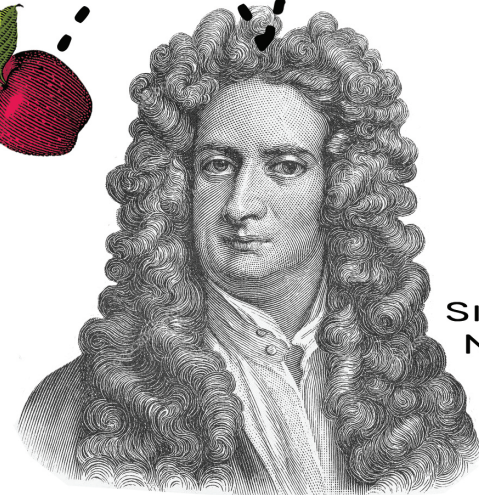
THE SCIENCE BEHIND



HOW IT WORKS

Sir Isaac Newton (1643-1727) was an English mathematician and physicist whose ideas are a significant influence in nearly all areas of modern science, mathematics, and other fields of learning. When people hear the name *Isaac Newton*, they usually think of the apple falling hitting his head, which led him to understand and explain

GRAVITY. In physics, gravity is the natural force that causes things to fall toward the earth. Newton also gave us his three **LAWS OF MOTION**



SIR ISAAC
NEWTON

Newton's **First Law of Motion** (sometimes called the law of inertia) is at work in our experiments. **It states that an object at rest will stay at rest and an object in motion will stay in motion.**

In experiment one, the coin you set in motion (the one you flick) stays in motion pushing the bottom coin in its path. The stacked coins above it remain in place because they have enough inertia to prevent them from moving. The same principle is shown with the index card and stack of coins in experiment two. Objects tend to “keep on doing what they’re doing”. The natural tendency of objects to resist change in their state of motion is described as **INERTIA**.

Inertia is the resistance an object has to a change in its state of motion. Inertia is also the tendency of an object to keep moving in a straight line at constant velocity. The principle of inertia is one of the fundamental principles of physics used to describe the motion of objects and how they are affected by applied forces.

The **Second Law** says that the acceleration of an object produced by the net applied force is directly related to the magnitude of the force and inversely related to the mass of the object. The second law shows that **if you exert the same force on two objects of different mass, you will get different accelerations** (change in motion).

The **Third Law** says that **for every action there is an equal and opposite reaction.**