

# Does Newton Apply?



I have all  
the answers.

## The Questions

Make sure everyone in your group can answer at least four of six questions correctly.

1. What is Newton's first law of motion?

**Answer:** An object at rest wants to stay at rest. An object in motion wants to stay in motion.

2. What is inertia?

**Answer:** Inertia is the tendency of an object to keep doing whatever it's already doing. If it's resting, it stays resting. If it's moving, it keeps on moving.

3. What is an example of inertia?

**Answer:** Here's one example: When I'm sitting in a moving car and the car stops, I keep moving forward. That's because I want to keep moving. What are your examples?

4. How does inertia explain why you should wear a seat belt in a moving car?

**Answer:** When a car stops suddenly, inertia keeps your body moving forward. The seat belt stops you from smashing into the dashboard.

5. Does the BAAD that Doug is holding have inertia?

**Answer:** Yes, the BAAD has inertia. An object has inertia whether it's moving or standing still.

6. How does inertia explain why the BAAD hits Cramwood in the back of the head?

**Answer:** The BAAD is moving along with the bike. When Cramwood stops, the BAAD wants to keep moving and continues to move forward to smack him in the head.

## Your Prediction

Alison Krempel said that the problem with the BAAD all has to do with Newton's first law of motion. Doug Savage says it doesn't apply. What do you predict the court will decide?

**Does Newton's first law of motion apply to the BAAD?**

yes  no

# Will the Toothbrush Stop?



Part 2



What can I say?  
I'm the answer  
queen.

## The Questions

Make sure everyone in your group can answer at least four of six questions correctly.

1. Let's say an object is at rest. What's necessary to put it in motion?

**Answer:** A force, like a push or a pull, is necessary to overcome the object's inertia and get it moving.

2. Now that it's in motion, what will slow the object down?

**Answer:** Friction will slow it down, as the object rubs against things like the air or the ground.

3. Why don't things moving through outer space slow down?

**Answer:** There's no air in space, so there's no friction from the air to slow things down.

4. What is friction?

**Answer:** Friction is a kind of force that occurs when things rub against each other.

5. What is an example of friction?

**Answer:** Here's one example: When I stop pedaling my bike, it slows down because the tires are rubbing against the ground and my body is rubbing against the air. What are your examples?

6. What is an example of a force that gets things moving?

**Answer:** Here are two examples: When you throw, your arm pushes the ball into the air, and gravity is the force that pulls the ball back down. Did you think of other examples?

## Your Prediction

A motion expert has testified that if you gave Fred's toothbrush a little push in outer space, it would keep going forever. Doug Savage found that hard to believe. What do you predict they will say in court?

**Will Fred's toothbrush keep going and going?**

yes  no

# Cramwood's Mistake?



## The Questions

## Your Prediction

Make sure everyone in your group can answer at least four of six questions correctly.

1. What is mass?

**Answer:** Mass is the amount of matter, or stuff, that something is made of.

2. Which has more mass: the regular BAAD or the one that's covered with tape?

**Answer:** The BAAD covered with tape has more mass because it includes both the mass of the BAAD plus the mass of the tape.

3. What is the relationship between mass and inertia?

**Answer:** The greater an object's mass, the greater its inertia.

4. Which has more inertia: the regular BAAD or the one that's covered with tape?

**Answer:** The BAAD covered with tape has more inertia because it has more mass. The more mass something has, the more inertia it has.

5. Which object requires more force to stop: a bus moving at 5 miles per hour or a bike moving at 5 miles per hour?

**Answer:** The bus would require more force to stop.

6. About the last question, why would one require more force than the other?

**Answer:** The bus has a lot more mass than the bike. And remember, the more mass, the more inertia, so the more force needed to stop it.

Professor Parsons says that Cramwood made a mistake with his BAAD. What could it have been? What do you predict the court will say? Write your answer to the question below on the other side of this page.

## What was Cramwood's mistake?

**Answer:** By adding tape to his BAAD, Cramwood increased its mass and increased its inertia. The bigger BAAD requires more force to stop and ends up smacking Cramwood in the head when he applies the brakes.