



Newton's Wacky Apple Challenge

Discover how gravity, friction, and inertia pull the strings in this topsy-turvy challenge!

They say one falling apple helped Newton unlock the secrets of gravity. But what else was going on? With friction, inertia, and gravity all tugging at once, it's time for YOU to take charge and see if you can control where the apple ends up!

Before we start – what do YOU think will happen?"

- Will the apple shoot sideways when you pull the card...
- Or will it drop straight down into the cup?

What You Need

- 1 large water pitcher (filled $\frac{3}{4}$ with water)
- 1 sturdy rectangular card
- 1 long cardboard roll (to balance the apple on)
- Test objects: apple, orange, lemon, or even an egg!
- A table or flat surface for setup
- Parent or adult supervision (especially for splashes!)



NOTE: FREE sample: © The Crazy Scientist® Pty Ltd

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Step-by-Step:

1. Balance the Cardboard Tube

Place the card on top of the jug of water. Stand the cardboard tube straight up in the middle of the card.

2. Get Ready to Drop

Hold the apple (or orange) above the tube so it's lined up with the jug's opening.

3. Let Go!

Quickly pull the card sideways. The card zips out – and the apple drops straight down into the jug!

Tip: If it misses, try again. The faster and straighter you pull, the better it works.

Observations

- Did the apple drop straight down into the water?
- If you record it in slow motion, you might spot the apple pausing in mid-air for a split second before it falls.



Safety

Adult supervision required.

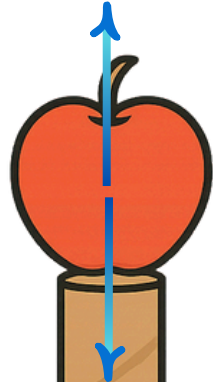
Water can splash onto the table or floor. Wipe up spills right away so no one slips.

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What's going On?

According to Newton's First Law of Motion, an object at rest will stay at rest unless acted upon by an unbalanced force.

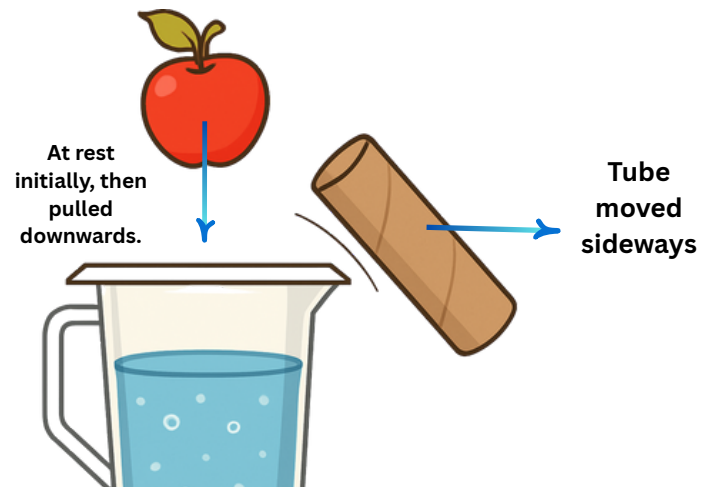
force from tube



Balanced forces & apple is at rest.

In this experiment, the apple was resting on top of the cardboard tube. When the card was pulled sideways, friction between the tube and the card made the tube slide out quickly from underneath the apple.

Because of inertia, the apple resisted the change in motion and stayed in the same position for a split second. But once the tube was gone, there was no longer any upward force holding it up. The forces became unbalanced — gravity was the only force acting, so the apple dropped straight down into the water.



Does the mass of the object affect how it falls?

Try the experiment again, but this time swap the apple for different objects — like a lemon, orange, egg, or golf ball. Watch carefully: do they all fall the same way?

In science, it's important to change only one thing at a time (this is called the independent variable). In this case, the thing you change is the object's mass. Everything else (the card, tube, and jug of water) should stay the same, so you can clearly see the effect of mass on how the object falls.

Take it Further with Exclusive Parent & Teacher Resources

We explored gravity, inertia, friction and Newton's first law of motion in this experiment, which can be difficult to understand.

Next-Level Science: In our Patreon Club, we have ways of showing you variations on this experiment & more.

You'll get:

- Explanations of this experiment & Newton's 1st Law of Motion.
- Hypothesis, variables & more.
- Teacher notes comparing physical vs chemical changes.



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Test different objects (apple, orange, lemon, golf ball, egg). Do heavier or lighter ones fall differently when the tube is pulled away? Record your results.

Use a phone or tablet to film the moment in slow motion. Can you see the exact instant the tube slides and the object begins to fall?

Design a "tube launcher" or slider that lets the card/tube be pulled away quickly and smoothly every time. Does it improve your experiment's consistency?

Draw or create a cartoon of the apple's "drop journey" — show the forces at work (gravity pulling down, support force gone). Give it a funny thought bubble!

Measure and compare the time it takes different objects to fall. Make a chart or graph showing whether mass affects falling speed.