

# Gravity

Running Time: 26 Minutes

## Nifty questions in this episode:

- What makes the Earth go around the sun?
- What is gravity?
- If a bowling ball and an apple are dropped at the same time from 20 meters up, which will hit the ground first?
- Would there be a sky without gravity?

## Awesome answers:

- Gravity keeps the Earth revolving around the sun.
- Gravity is a force that pulls everything (air, water, earth) toward the center of the Earth.
- Both the bowling ball and the apple will hit the ground at the same time.
- No! Gravity is what holds the atmosphere around the Earth.

## Experiments shown on the video:

### NEWTON'S APPLE

**Objective:** To make a model of how the Earth travels around the sun.

- Roll a sock into ball (the Earth).
- Wrap the sock with string (Earth's gravity).
- Thread the loose end of the string through an empty toilet paper roll.
- Tie the loose end of the string to a plastic bag containing an apple (the sun).
- Hold the paper roll with your hand.
- Raise your hand above your head and move your hand in a counterclockwise motion.
- The sock (Earth) will move around the apple (sun).

## More interesting stuff to do:

### SWING STRING

**Objective:** To determine if the weight of an object (mass) and its string length (pendulum) will pass a midpoint at the same duration of time and speed.


- Cut two pieces of string, each 1 meter long; tape one string to a glass marble and the other to a steel ball.
- Tape the loose end of the string attached to the steel ball to the top of a door opening.
- Pull the steel ball back 10 centimeters and release.
- Record how many seconds it takes for ten complete swings (one complete swing equals the ball returning to the starting point once).
- Use the same procedure as in the 10-centimeter trial, but this time pull the string back 20 centimeters and release.
- Compare both trials and write a conclusion.
- Now tape the loose end of the string attached to the glass marble to the top of the same door, 30 centimeters away from the steel ball. Make sure the strings are the same length.
- Repeat the 10-centimeter trial for the glass marble and record the number of seconds.
- For the last test, shorten the strings on the steel ball and glass marble to one-half meter.
- Repeat the 10-centimeter and 20-centimeter trials. Record all results.

### PUSH ME, PULL ME

**Objective:** To demonstrate the effect of gravity on moving objects.

- Sit on a tall stool with a 360-degree rotating seat.
- Lift your feet off the floor and keep your knees together.
- Place both hands on your chest.
- Have a partner spin you on the stool (not too fast).
- Stick your feet straight out in front of you while spinning; at the same time, extend your arms straight out to your sides.
- Pull your arms and feet back in to your body. Continue spinning and repeat the procedure for a few times.
- Try different combinations of feet and arms. Experiment!
- Are you experiencing centripetal or centrifugal force . . . or both?

*Way Cool Scientist: John Otake, Aeronautical Engineer*

 closed-captioned



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