Newton's First Law

Background:

Isaac Newton (a 17th century scientist) put forth a variety of laws that explain why objects move (or don't move) as they do. These three laws have become known as Newton's three laws of motion. The focus of Lesson 1 is Newton's first law of motion - sometimes referred to as the **law of inertia**.

Newton's first law of motion states that objects at rest tend to stay at rest, and objects in motion tend to stay in motion, unless acted on by an external/unbalanced force.

Inertia is the tendency to resist changes in motion, and the more inertia something has, the more force will be necessary to change its state of motion.

Video Links:

http://www.nsf.gov/news/special_reports/football/lawofmotion.jsp this video demonstrates how inertia works in NFL football (running back vs. linebacker), and explains mass vs. weight

https://youtu.be/pxWHWOYVov4 This short video demonstrates a Hero engine at rest being heated enough that steam escapes its pipe "arms". The expulsion of the steam causes the ball to overcome inertia and spin around. Video quality is excellent; narrated explanation will be easy for kids to understand.

Everyday examples:

a) car suddenly stops and you strain against the seat belt https://www.youtube.com/watch?v=d7iYZPp2zYY (this is a crash test video with dummies)

b) when riding a horse or a bike, the horse/bike suddenly stops and you fly over its head https://youtu.be/du-IiozK1UM

c) the magician pulls the tablecloth out from under a table full of dishes
d) While riding a skateboard (or wagon or bicycle), you fly forward off the board when hitting a curb or rock or other object that abruptly halts the motion of the skateboard.
e) chopping wood

Hands-on experiments that can be done in class:

https://youtu.be/T1ux9D7-O38 7 simple inertia demos for the classroom

https://youtu.be/uOSBC0SXVR4 (similar to magician tablecloth trick, objects drop into bottle/jar)

http://www.stevespanglerscience.com/lab/experiments/egg-drop-inertia-trick/ this is also on YouTube https://youtu.be/zEueIWMRXNQ

http://www.stevespanglerscience.com/lab/experiments/newtons-bottle/ this could be done with nickels/quarters/loonies on the top of any bottle. You can flick a playing card instead of pulling a bill

http://www.stevespanglerscience.com/lab/experiments/trick-with-tablecloth/ (tablecloth trick, there is another option at the bottom of the page)

http://www.stevespanglerscience.com/lab/experiments/coin-tower/ Friction could be discussed here

https://youtu.be/1_EV2KEnqoQ this is a demo using "inertia beads" but could be done with Christmas bead garland

Could also use this lesson demo on balanced/unbalanced forces: http://www.brighthubeducation.com/middle-school-science-lessons/35939-newtons-first-law-of-motion-science-lesson-plan/

https://www.wisc-online.com/learn/natural-science/physics/tp1202/newtons-first-law-of-motion# This is an animated/interactive video that could be used as part of a Webquest/lab investigation.