



Study guides are available to complement each one of our shows. Every study guide reviews the basic concepts that underline the skills presented, gives a list of relevant vocabulary with definitions, includes a bibliography for further reading, and gives instructions for scientific experiments and educational activities for you to try that demonstrate the principles covered in the show.

**Here's an activity that demonstrates principles introduced in The Anti-Gravity Show:**

**Activity:** Lasso

**Demonstrates:** Centripetal force

**You will need:** Jump rope with swivel handle (so rope spins inside handle), strong scissors

1. Cut off one handle.
2. Find the point on the rope that is approximately one third of the way from the remaining handle to the end.
3. Tie the end with no handle to the point you just found. Pull the knot as tight as you can.
4. Hold the handle between your thumb and first two fingers. Point the rope straight down, and begin to make small circles with your wrist until you get the rope spinning in a loop.
5. Don't spin too fast, and don't use your whole arm; just your wrist.  
With a little practice, you can learn to do it!

**Activity:** Balancing

**Demonstrates:** The center of gravity

**You will need:** A stick at least 2 feet long or a broom or a plastic baseball bat or a Peacock feather.

**Purpose:** Try to balance an object in your hand.

1. Long things are easier to balance than short things.
2. Keep your palm flat or your finger straight.
3. Place the object you are going to balance in the palm of your hand, or on the tip of your finger
4. Look at the top of the object, not the bottom.
5. Let go of the object with the hand that is holding it, then move your hand so that it stays directly underneath the top.
6. Don't stand still. You may have to move around to keep your hand under the top.
7. Practice balancing things on your chin, elbow and foot. Finding the center of gravity is essential to all balance. See what else you can balance! Remember, always watch the top and keep the bottom underneath it.

## **VOCABULARY**

**Physics:** The study of energy and matter and their relationship to each other and human beings.

**Energy:** The invisible force that makes things move, grow, breathe and live.

**Matter:** Anything that takes up space and has weight. All matter is composed of atoms.

**Force:** A push or pull in any direction. Gravity, electricity, and magnetism are invisible forces. Hitting a ball with a bat is a visible force.

**Circle:** A continuous loop with no beginning or end. A hula hoop is a circle.

**Cylinder:** An elongated circle. Straws are cylinders.

**Sphere:** Any object that is equally circular on all sides. Baseballs are spheres.

**Centripetal Force:** Any force that makes something go in a circle.

**Centrifugal Force:** Often confused with centripetal force. It is any force that makes an object move away from the center of a larger object that is spinning.

**Gravity:** The downward pull on objects. Gravity is different on earth than it is on the moon. There is no gravity in outer space.

**Center of Gravity:** The point where something will balance. The weight of the object seems to be centered on that point.

**Balance:** When the downward pull of gravity is equal on all sides of an object, so it does not fall.

**Sound:** Vibrating energy that causes the sensation of hearing.

**Speed of Sound:** 761 MPH; 1100 feet per second; 1225 KMP.

**Sonic Booms:** When an object travels faster than the speed of sound it breaks the sound barrier and creates a sonic boom.

**Light:** The invisible form of energy - solar or electrical - that allows us to see.

**Reflect:** When light bounces back to its point of origin, in a straight line.

**Refract:** When light bends, it often creates a rainbow or spectrum.

**Spectrum:** The colors found in light - red, orange, yellow, blue, indigo, and violet. They are the colors found in the rainbow.

**Air Pressure:** The constant pressing of the earth's atmosphere at a rate of 14.7 pounds per square inch.

**Motion:** Anything that is moving.

**Inertia:** The resistance to change in motion. An object at rest will stay at rest and an object in motion will stay in motion until some FORCE changes its motion.

**Friction:** A force that pushes against a moving object, making it slow down or stop.