

Kindergarten
February
Gravity

Station 1: Do you know what makes things fall?

Materials:

Book: I fall down. Author Vicki Cobb

a jar of honey

a spoon

a penny

a key

button

pin

eraser

a dry sponge

a small bar of soap

2 rubber bands of same size

1 kids shoe

1 adult shoe

Station 2: Center of gravity or Balancing point

Materials:

typing paper

pencil with a flat eraser

scissors

modeling clay

small paper clips

paper bee template

balancing bird

Station 3: Parachute

Materials

plastic bag

cotton thread

sticky tape

scissors

ruler

small plastic toys

EXTRA ACTIVITY: The vortex or gravity well can be used with any of the stations you prefer. (SEE END OF DOCUMENT)

Materials

vortex

coins

marbels

Station 1: Do you know what makes things fall?

Read the book: I fall down by Vicki Cobb. The book is designed so that the kids can make discoveries. It poses a series of questions that can be answered by doing activities that temporarily take the child away from the book.

Activity 1: Demonstrate how gravity pulls.

Materials:

- a jar of honey/molasses
- a spoon

Take a spoonful of molasses or honey and point the spoon down so that the goo dribbles back into the jar. The goo stretches and gets longer and longer. It looks like a ribbon streaming into the jar. Gravity pulls the molasses from the spoon back into the jar.

Activity 2: Do some things fall faster than others?

Materials:

- a penny
- a key
- button
- pin
- eraser

Hold a penny and key in one hand. Open your hand so they both start falling at the same rate. Listen and watch as they hit the floor. Did either the penny or the key win the race, or was it a tie? Have a few other dropping races using various other small objects.

Discussion points: Things fall so fast it is not easy to tell if there is a winner or loser. But no matter whether the object is big or small, it seems that its always a tie.

The only time you have a clear loser is when you drop something that the wind could easily blow away, such as a feather or tissue. You see air fighting gravity only with very light objects.

Activity 3: Does everything land with the same force? Or do some things hit harder than the other?

Materials:

- a dry sponge
- a small bar of soap

Have someone drop a dry sponge into the kids hand from about a foot above it. Next try a small bar of soap. Which hits hand harder, the sponge or the soap?

Your hands stop the sponge and the soap from falling to the ground. But you can still feel gravity's pull on the soap and sponge when you hold them in your hands. This pull is called weight.

Activity 4: How can you tell if one object is heavier than another without letting either of them fall.

Materials:

- 2 rubber bands
- 1 kids shoe
- 1 adult shoe

Tie one of your shoes to one rubber band. Tie one of the adult shoe to the other rubber band. Lift both shoes by the rubber bands. Which rubber band stretches more? The heavier shoe stretches the rubber band more. Each rubber band acts like a scale to measure weight.

Station 2: Center of gravity or Balancing point

Materials:

- typing paper
- pencil with a flat eraser
- scissors
- modeling clay
- small paper clips
- paper bee template

Activity 1:

1. Use the paper bee as a stencil to draw the design on the typing paper.
2. Cut out the bee from the paper.
3. Press a piece of clay on a table. Stand the pencil, eraser pointing up, in the clay.
4. Place the bee on top of the pencil's eraser. Move the bee to find the point where the bee balances.
5. Attach one paper clip to each wing tip. Adjust the clips so that the bee balances on the tip of its head.

Observation: Without the paper clips, the bee balances on a point near the center of its body. The bee balances on the tip of its head when the paper clips are added.

Discussion points: The place on the bee where it can be balanced is called the center of gravity. This is the point where all the parts of the bee exactly balance each other. All objects can be balanced and thus have a center of gravity. Supporting any object at its center of gravity position will make it balance. Adding the paper clips increases the weights on the wings. Weight is a measure of the forces of gravity, a downward pull on an object. The weight of the metal clips shifts the position of the center of gravity to the head of the bee.

Activity 2:

Use the balancing bird to let them experience the center of gravity.

Material:

Balancing bird

Station 3: Gravity and Parachute

Materials

- plastic bag
- cotton thread
- sticky tape
- scissors
- ruler
- small plastic toys

Activity:

6. Cut two squares out of the plastic . Make one piece about 8 inches (20 cm) square and the other one about 12 inches (30 cm) square.
7. Cut four lengths of thread for each square (that's eight lengths altogether). Make them all about 11 inches (28 cm) long.
8. Tape one thread to each corner of both squares. Make sure the tape is on the outside of the squares.
9. Collect the ends of each set of four threads and loop them into a knot to keep them together.
10. Choose three plastic toys of roughly the same size and weight. Take two of the toys and tie or tape each one to the knotted end of a parachute.
11. First drop the toy on its own. Count how long it takes to hit the ground. Now, drop each of the parachutes in turn. How long does each parachute take to land? Is there a difference between them?

Observation: The fastest to fall is the toy on its own. The slowest should be the largest parachute.

Discussion points: When an object is dropped, it rushes to the Earth at a very fast speed. Parachutes, as you can observe through experiment, help slow the object down. How do they do this? Parachutes trap air; the air then pushes upward against the parachute, while gravity continues to pull the parachute downward. The effect is a slower fall for the object that is attached to the parachute. We call this effect air resistance or drag.

Similarly, a leaf floats gently to the ground, while an apple hits it with a thud. The pull of gravity alone would cause both of them to fall together,

but the leaf falls more slowly because of its shape. A leaf has a flat thin shape. When it falls, it traps more air underneath it than the apple. The air pushes up against the leaf and slows it down. The air is resisting, or pushing against the pull of gravity. If the apple was thin and flat like the leaf, it would fall slowly, too.

EXTRA ACTIVITY: THE VORTEX

The vortex or gravity well can be used with any of the stations you prefer.

Material:

- Vortex
- Coins
- Marbles

A gravity well or vortex is a curved funnel. Roll balls around this funnel and they seem to defy gravity (as many different forces act on it) but eventually the balls fall into the gravity well.

Activity:

Roll a marble from the top so that it moves in a circle near the top of the gravity well.

Notice that the marble keeps rolling in a circle but that it slowly drops down into the gravity well.

As the marble drops lower into the well it goes around the circle in a shorter time. This becomes dramatically apparent when the marble approaches the center of the well. Where it zips around so fast it becomes a blur.

If you roll two marbles, one slightly nearer the center than the other you can observe their relative velocities, the outer one is slower and the inner one is faster.

Explanation:

Friction removes some of the energy of the rolling marble causing it to drop down into the well.

When the marble drops down into the well some of its gravitational potential energy is converted into kinetic energy.

The potential energy of the marble is converted to kinetic energy so that as the marble drops down it has a higher velocity. Not only does the marble go around in a smaller circle as it drops down into the gravity well, it travels around at a higher velocity. The result is that the marble completes orbits much more rapidly near the center of the well.