Balancing Act

You’ll explore the idea of balance and create your own balance scale to conduct experiments!

Ideas to Explore

What does it mean for something to be “balanced”?
What is gravity and how does it work?

Make this!

Words to Know:

**Weight** – the heaviness of a person or thing

**Balance** – when all sides of an object have the same amount of weight, or mass

**Force** – a push or a pull between two objects

**Gravity** – one of the four forces of flight; gravity is the force that pulls objects towards Earth

**Scale** – a tool used to measure weight
Stuff You’ll Need:

- Three or more types of objects of different weights - try to find at least two of every type of object
  - Examples of things you could use: coins, game pieces, binder clips, marbles, rocks, markers, crayons, Legos, toys (pictured to right)

- A coat hanger (hangers with divets for straps work best!)

- Two identical containers
  - Examples of possible containers: paper plates, paper cups, clean recycled containers (the same kind)

- A single hole punch OR tape (any kind)

- Scissors

- String

- Optional: a ruler or tape measure to measure the string

- Optional: things to decorate your balance scale with (like washable markers and stickers!)

Before you start!

- Gather your supplies and set up a space to build your balance scales. Decide where you will conduct your experiment. Hanging the coat hanger on a door handle works well!

- Investigate balance and gravity:
  - For something to be balanced, an object’s weight must be evenly spread out. When an object isn’t balanced, one side of an object (the lighter-weight side) will be higher than the other, heavier side – just like when only one person sits on a seesaw!
  - Gravity is the force that pulls things down towards Earth. A force is a push or a pull between two objects. When you drop something and it falls to the floor, gravity pulls it down.
Make It!

Step One
Optional: decorate your containers!

If you’re not using a hole punch, go to Step Two! If you’re using a hole punch, punch two holes into each of the containers (four holes in total). The holes should be at the same height and should face each other.

Step Two
Cut two pieces of string that are each approximately 3 feet long. Use a ruler, tape measure, or the span of one arm to measure the length.

Step Three
If you used a hole punch (Option 1), thread a piece of string through one of the holes in a container and tie a knot. Take the other end of the string and tie it to the other hole, creating a big loop.

Do the same thing with the other container and piece of string.

If you’re attaching the strings with tape (Option 2), tape one end of the string to one side of a container. Tape the other end of the string to the opposite side of the container so that the strings’ ends face each other, creating a big loop.

Do the same thing with the other container and piece of string.

When the strings are attached, the containers will look like two buckets with really long handles.
Step Four
Hang the hanger on a doorknob, a drawer handle, or somewhere else where it can swing side-to-side and not hit something. Place it somewhere low enough where you can easily reach it!

Step Five
Hang the loops on either side of the hanger. If the hanger has divets, place the loops inside the divets so that they don’t fall off. (If you’re using a hanger without divets, tape the loops to the hanger so that they don’t fall off.)

The containers should be level. If they’re not, adjust the strings.

Step Six
Experiment!
Pick up two different kinds of objects and put one object into each container. Which object is heavier?

What happens when you put the same type of object into each container?
Can you balance the scale using different types of objects?

Want More?
Read the book *Just a Little Bit* by Ann Tompert. It’s available on Amazon and you can also find many free recordings of it being read aloud on YouTube!

Learn about the four Forces of flight from NASA!

Learn how the forces affect airplanes. Read about how the forces must be balanced when airplanes are in flight!

During your visit to The Museum of Flight...
Visit the Tower Exhibit to watch airplanes take off and land at Boeing Field. Discuss the ways that you see the forces in action!
Make it Connect!

- **Give someone a high five.** When your hands come together, there’s pressure from the push. When you take your hands away, there’s a pull.
  - When you give someone a high five, you’re experiencing forces – pushes or pulls between two objects! What are some other ways that you can observe the forces?

- **Airplanes carry people, luggage, and supplies.** These things are called cargo and the cargo’s weight has to be spaced evenly throughout a plane. If the cargo isn’t spaced out evenly, the plane won’t be balanced!
  - How would a plane fly if all of the cargo was on one side? What would that plane look like? How would a plane fly if all of the cargo was in the tail? What would that plane look like?