



Try This at Home Science: Balance the Scales

Activity Overview:

Create your own balance scale and learn how to estimate relative weights of small objects.

Materials:

- Hanger
- 2 empty fruit containers or other identical containers
- Bottle cap
- Stick or ruler
- Tape
- String
- Small objects
- Scissors
- Door knob or drawer handle
- Optional: small construction paper triangle

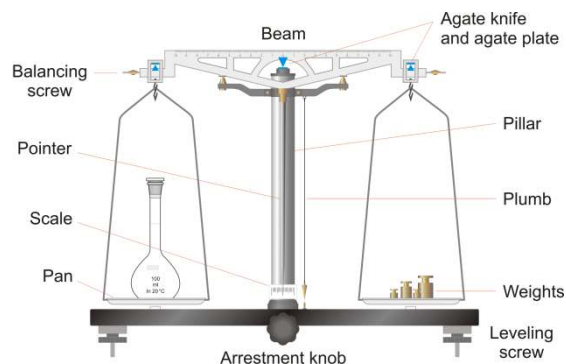


Try this!

1. Lay the hanger flat and tape the ruler to the middle of the hanger to make the **pointer**. Optional: add the small construction paper triangle to the bottom of the pointer.
2. Cut a length of string 1 foot long. Tie the bottle cap to one end of the string, and the other end to the handle of the hanger to make the **plumb**.
3. If the fruit container has a lid, use the scissors to cut it off.
4. Use the scissors to cut two lengths of string, about 2 feet in length each.
5. Thread 1 string through 2 holes on one side of the container, and repeat on the opposite side of the container. The container is now a **pan**.
6. Repeat Step 3 on the second fruit container.
7. Tie the two fruit containers onto the far ends of the hanger. The hanger is the **beam**.
8. Hang the hanger on a door knob to make the **fulcrum**.
9. Take several small objects and try to balance the scales. What do you notice?
10. Take 4 of the same small object and balance the scale. What do you notice?
11. Compare the weights of the objects from Step 8 and 9. Which weighs more?
12. Balance the scale using the objects from Step 10.
13. Continue to compare the weights of different objects from around the house and try to balance out the scale.
14. Clean up by putting all of the objects away, recycle any reusable parts from your balance scale, or hang it up in the closet for another day!

What's happening?

We have created a balance scale similar to those used throughout history. This simple machine is another form of a **lever**! The part hanging on the door knob is the **fulcrum**, or the balance point, and the long side of the hanger is the **beam** that we are trying to balance on the fulcrum. As we add objects into the fruit containers, the **pans**, we notice that the system may tilt to one side or the other until we have added enough objects to balance the scale. We are also able to compare the weights of objects by putting a single object in one pan, and a different object in the other pan. We can even designate units, like 1 Barbie doll equals 2 bananas.



STEM History Fun Fact!

Hundreds of years ago there were no automatic scales to weigh things. Instead people used balance scales to compare weights of items. The saying “worth your weight in gold” was literally that! A person who had earned a reward would sit on one side of a balance scale and gold would be added to the other side until it was balanced. However, the meaning has changed over time, so instead of a reward in gold, it now means you are incredibly awesome!

When it came to trading, people used balance scales to compare objects to make fair trades. So if a person wanted a bag of rice, they might pay for it by adding objects onto a balance scale until the scale balanced, or became even, to keep the trade fair. Over time though, a more accurate system was needed. Standardized weights were created to be placed on one side of the scale, and the desired object would be placed on the other. Each weight was equal to an agreed standard unit. This would mean that if a person wanted 2 units of rice it would be weighed by placing 2 weights on a balance scale and comparing the rice to the units before payment was exchanged, and the product being handed to the customer.

Now try...

- Hang your scale from a string and repeat the experiment. What do you notice? Did you get the same results? Why may the results be different?
- Take a ruler and tape 2 cups to either end, and try to balance the ruler on a pop can. Repeat the activity to see if you can replicate your results. What did you notice? Which version worked better?
- Add a “scale” to the system by making a semi-circle, and dividing it into 10 equal parts. Each part becomes a unit of weight. Then tape the scale on the hanger so the pointer hangs in the middle. See if you can compare the difference in units between different household objects. Ex. 1 orange = 2 pop tarts.

Additional Information

Watch a how-to video for this experiment here <https://www.youtube.com/watch?v=tk8mSIETUw>