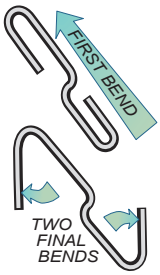
Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This **TOPS Idea** is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

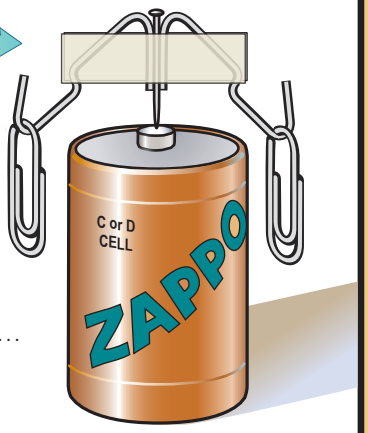
center of gravity

…adapted from **BALANCING #04** by TOPS Learning Systems



1. Bend ***two*** paper clips as shown. Tape them, front and back, to a pin to make a ***spinner***.

2. Balance your spinner on the "bump" on a battery by hanging a paper clip on each arm.

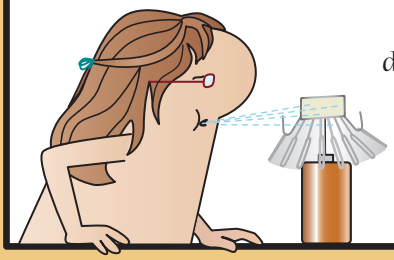


TIP: If it tilts, bend the *higher* arm *outward*.

3. How can you make your spinner…

a. Unstable? (Can't stand up.)

b. Very stable? Won't fall over.)



4. Your spinner's *average* weight distribution resides as a single point called its ***center of gravity***. As you add more clips, how does this center of gravity shift in relation to the pinpoint pivot?

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OBJECTIVE

To experience how lowering the center of gravity of an object increases its stability.

LAB NOTES

Copy the lab for each student or lab team.

Step 1. Lay the parts together on a table while taping them so the spinner will be flat. Masking tape works better than clear tape.

Step 2. The spinner will probably tilt at first. Gripping the tape firmly will help keep adjustments focused on the "elbow," so the assembly doesn't become warped by unintended alterations.

Step 3. Blowing on one side of the spinner makes it whirl!

MATERIALS

- A box of paper clips – all the same size and brand is best.
- A straight pin.
- Masking tape and scissors.
- A size C or D battery, dead or alive.
- Extension: a lump of clay, and second pin.

ANSWERS

3a. Removing the paper clips hanging from both arms makes the spinner unstable.

3b. Adding additional clips to each arm in equal numbers makes the spinner more stable.

4. Adding more clips lowers the spinner's center of gravity farther below its pinpoint pivot.

EVALUATION

Q. It is possible to balance a paper plate on the point of a pin. Would you more likely succeed with the rim up or with the rim down? Explain.

A. This is easier with the rim down, because the center of gravity will be lower than the pin point. *(It's virtually impossible with the rim up.)*

EXTENSION

Challenge: Can you balance your spinner on the head of another pin? You can use your battery and a lump of clay.

Mount the second pin on the battery with some clay. Hang many paper clips on the arms of the spinner to lower its center of gravity before setting it on the pinhead. A steady hand helps.

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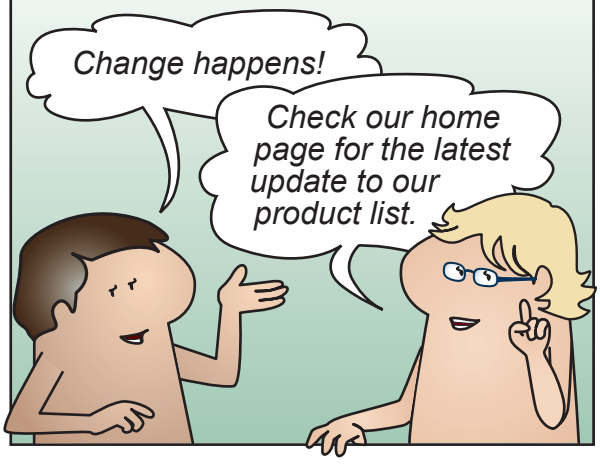
Find more at **www.TOPScience.org**!

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