



IT GIRLS

Drawbot Project
Berkeley Lake Elementary

MARCH 9, 2021



WHAT YOU NEED FOR TODAY'S SESSION

Bot Build

Make your drawbot's body by adding legs and the motor.

You'll need:



completed motor



drawbot body



adhesive strips and dots



sticky foam donuts



markers



scissors

Review of Forces

BALANCED AND UNBALANCED

Force

A push or a pull that can cause the motion of an object to change. It has two important properties:

Strength & Direction

Balanced Forces

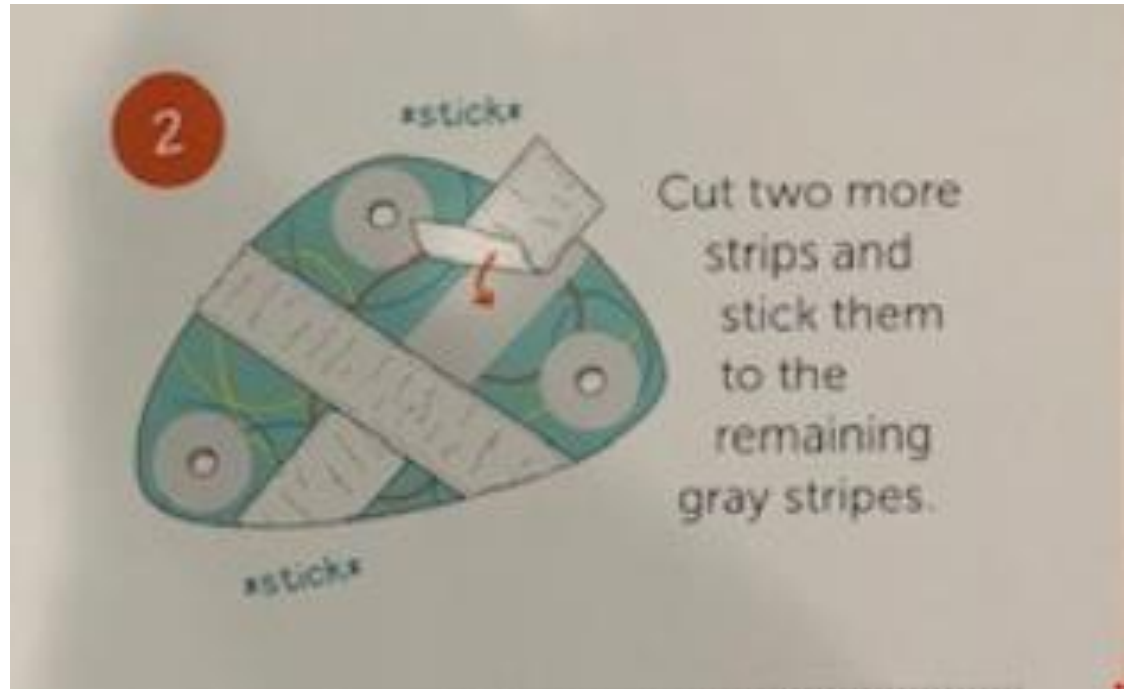
When two forces are of equal strength and there is **NO** movement.

Unbalanced Forces

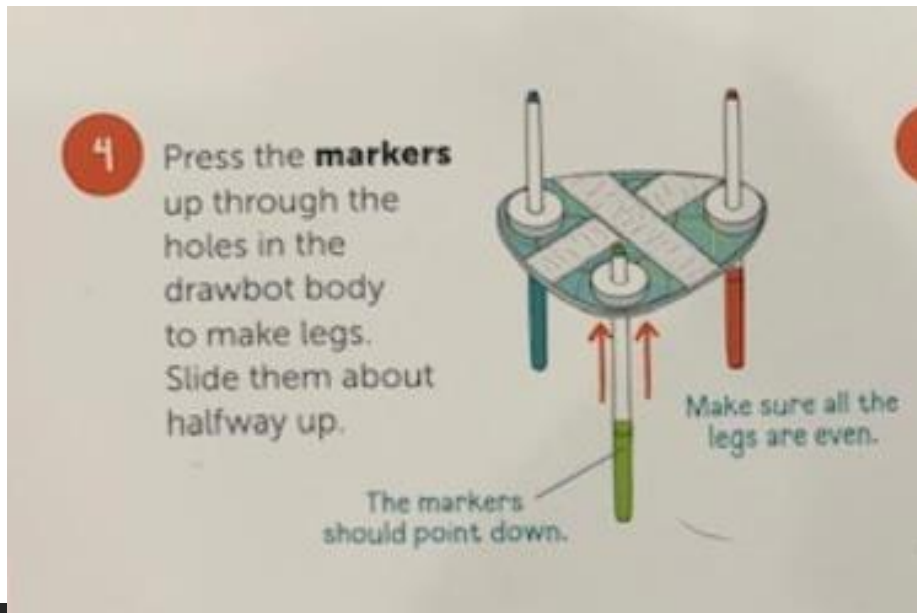
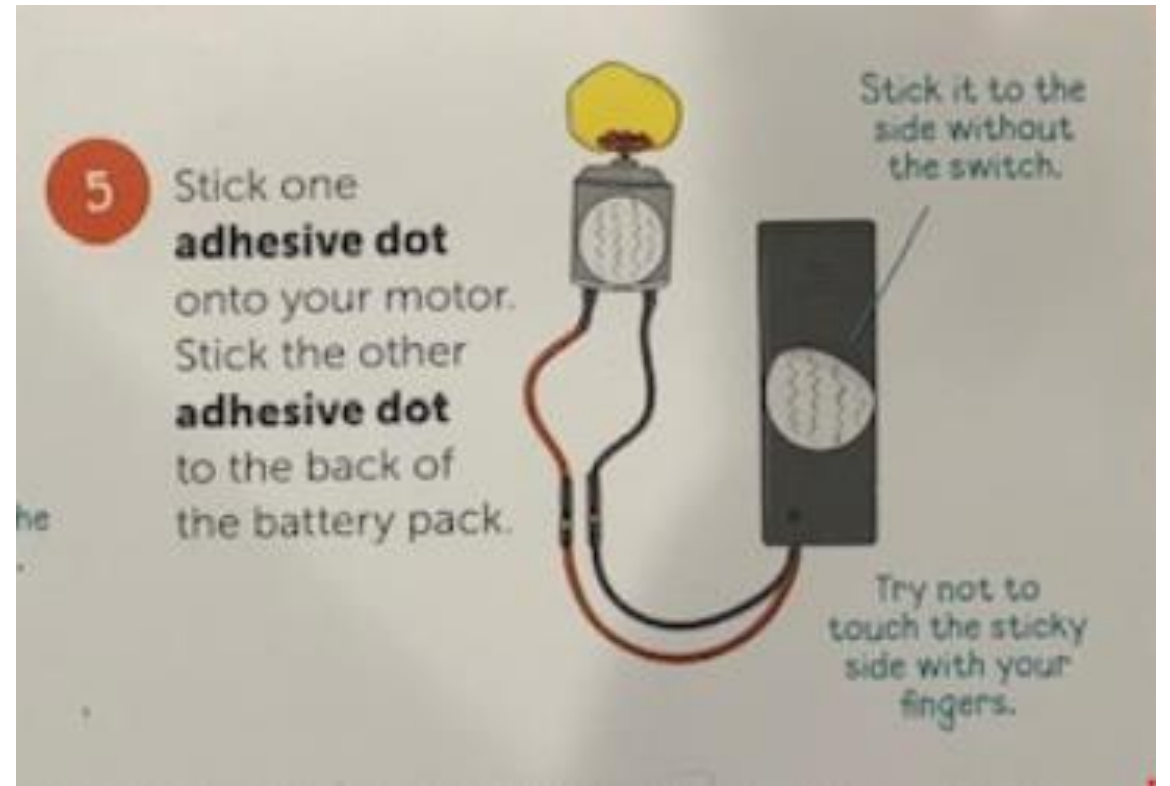
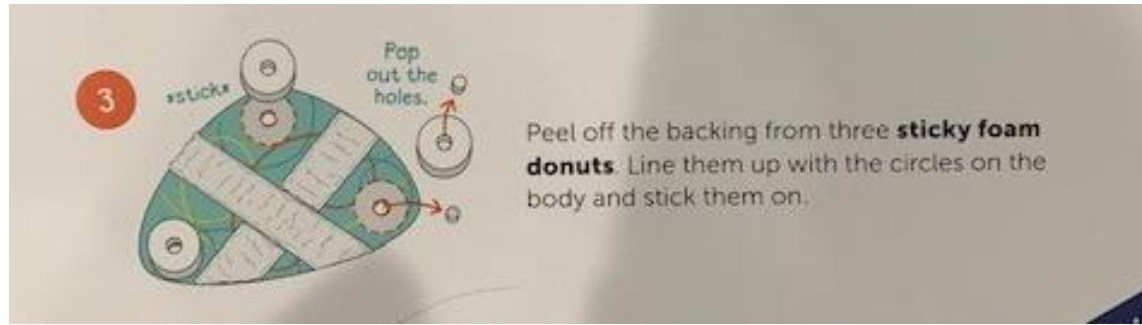
When one force is stronger than the other the result is **motion**

What To Know!

- ❑ The **Motor** applies forces to the clay
- ❑ As the motor spins, the heavy side and the light side have to switch places
- ❑ The unbalanced forces cause the motor to vibrate
- ❑ If the clay is mostly **even**, the forces on the motor are more balanced.



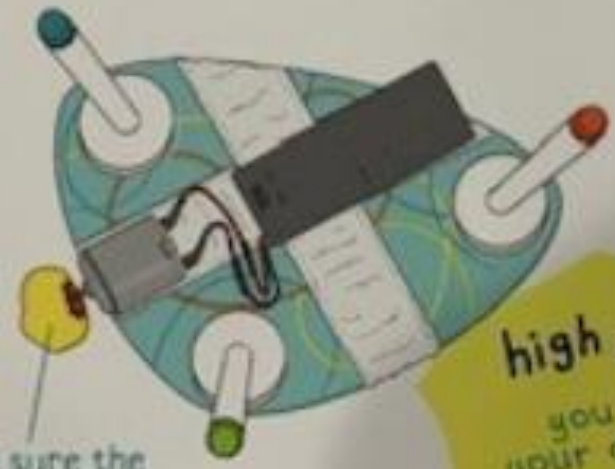
Here We Go!



6

Stick the battery pack and motor onto the drawbot body. Adjust them to make your drawbot stand by itself.

Make sure the clay hangs off the side.



high five!
you made
your drawbot!



Is your drawbot tipping over?
Adjust the legs. The markers should be half way through the body, and the body should be flat, not tipped.

LAST STEP – DRAWBOT COMPLETE!

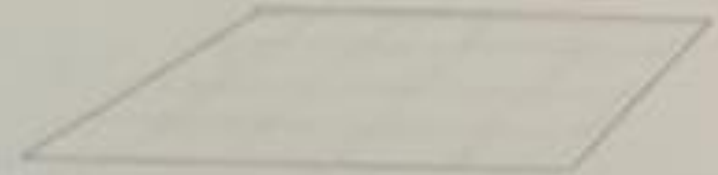


MESS WARNING!

The markers can bleed through the paper, so when you're not using your drawbot, turn it upside down.



1 Unfold the **paper** and spread it out on a table or hard floor. Smooth out the creases.

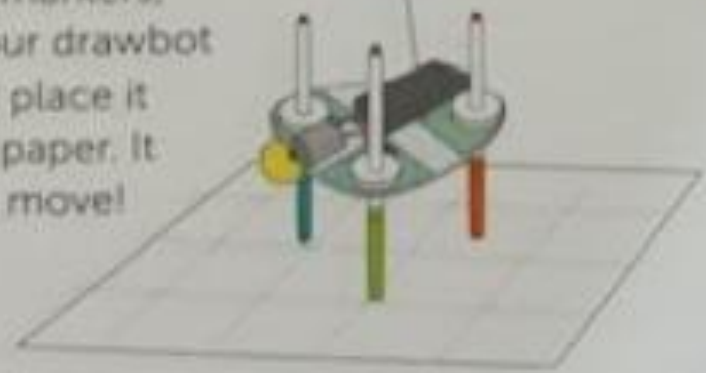


DRAWBOT ART

2

With the caps still on the markers, turn your drawbot on and place it on the paper. It should move!

Turn the switch to ON.



3

If it doesn't move, turn the drawbot off and adjust it until it does. (Flip the card over for how.)

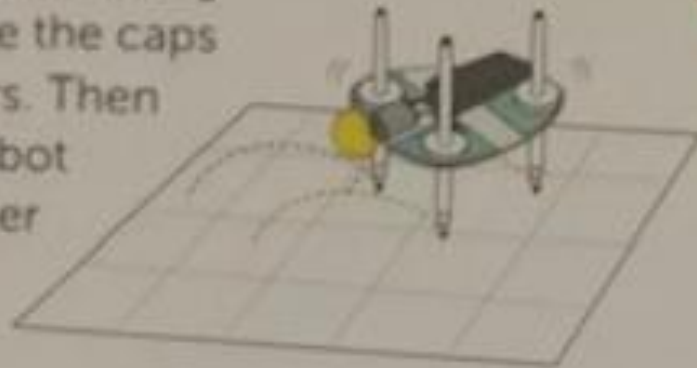
Motor off to adjust!



DRAWBOT ART

DRAW AND THEN CHANGE THE CLAY

- 4** Once you've got a moving drawbot, remove the caps from the markers. Then place your drawbot back on the paper and watch it draw!



If the markers get stuck on the creases, move the drawbot to a flat spot.

- 5** **Adjust the clay.** Squish the clay into a different shape and try it again. How does the drawing change?

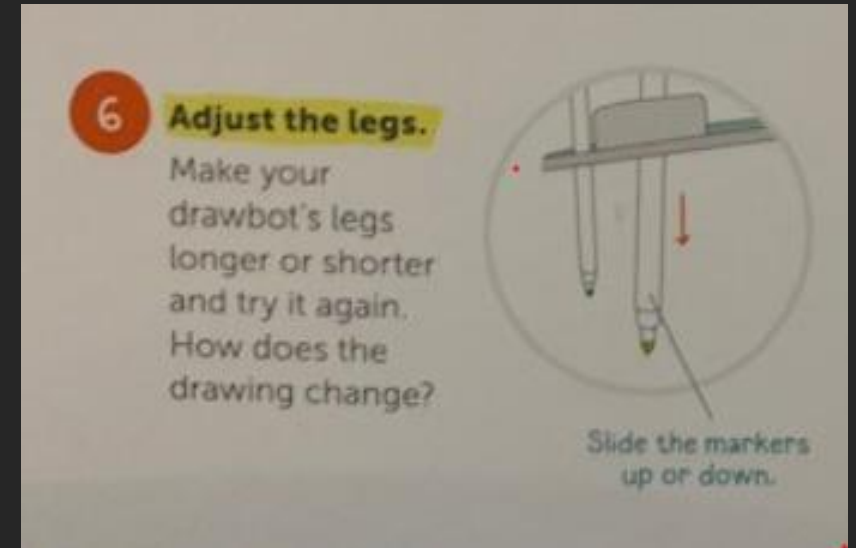


Motor off to adjust!



DRAWBOT COMPLETE

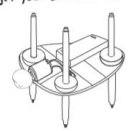
- By adjusting how your Drawbot balances, you can change the pattern it makes.
- Use the Robot Art Design Challenge handout to see what pattern your Drawbot makes.



Robot Art Design Challenge

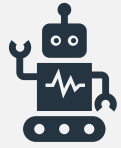
By adjusting how your drawbot balances, you can change the pattern it makes. Adjust your drawbot as shown for these challenges, then draw the pattern it makes.

Challenge #1

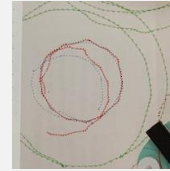
DRAWBOT	PATTERN
<p>Clay: Round</p> <p>Legs: Even</p> <p>Motor and battery pack: In a straight line</p> <p>Adjust these variables to get your drawbot ready.</p> 	<p>Draw the pattern your drawbot makes.</p> <p>If your drawbot doesn't move, make one leg a little longer or shorter and try again. Keep making small adjustments until it works!</p>

Challenge #2

Draw the pattern your drawbot makes.



FORCES ACTING ON THE MOTOR CAUSE THE DRAWBOT TO VIBRATE



IF THE CLAY IS OFF CENTER, IT CREATES LARGER VIBRATIONS (SHOWING UNBALANCED FORCES)



IF THE CLAY IS MOSTLY SYMMETRICAL, IT CREATES SMALLER VIBRATIONS, (SHOWING MOSTLY BALANCED FORCES)



BY CHANGING THE DIFFERENT VARIABLES OF THE DRAWBOTS DESIGN, YOU CAN CONTROL HOW THE DRAWBOT MOVES AND DRAWS.

KEY TAKEAWAYS



IT GIRLS SPRING PROJECT

If you enjoyed the Drawbot project, then tell us about it by submitting a short presentation about your build process, end result, and what you learned!

Presentation Guidelines:

- Be creative and original (you can make a video no more than 3 minutes long or Powerpoint presentation)
- Explain what you learned and the topics you covered
- Talk about your experiments with forces with your motor and Drawbot
- Tell us what you loved about the project and/or IT Girls

How to submit a video or presentation:

- Contact your teacher to tell her you are interested in participating and they will then send you a link to upload your presentation
- Participating in this contest means that you and your parents consent to having your video be possibly shared on IT Girls and other social media sites
- You must submit your entry by Midnight on Sunday, March 14th

IT Girls will select 4 winners (2 from each school) and they will each receive a \$25 Amazon gift card for the most creative presentation.

GOOD LUCK!

Thank

You!

