



Scribble Machines

Best for Ages

7+

Workspace

Tabletop surface
Indoors or outdoors

Is electricity required?

Yes, batteries

Description

Scribble machines are incredibly fun simple robots that will draw scribbles for you. Using a small motor, an offset weight, and markers, you can make a machine that will scribble on paper.

Materials

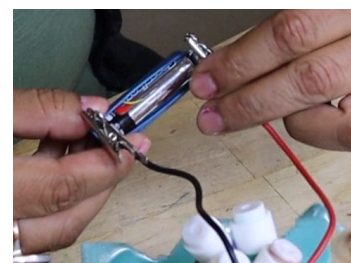
- Small DC hobby motor (1.5-3.0 volt)
- AA battery
- Item for offset weight (cork, clay, small eraser)
- Markers
- Rubber bands (thick broccoli bands, standard size bands)
- Paperclips
- Item for base platform (egg carton, yogurt cup, berry basket)
- Clothespins
- Craft supplies (tape, chenille sticks)
- Paper

Concepts Explored

- Cause and Effect
- Upcycling Materials

What to Do

1. Set up your scribble area by laying paper down on a table or floor.
2. Wrap a thick rubber band, like a broccoli band, around your battery and slide a paperclip under the band at the + and - poles of the battery. These are your attach points for your motor.
3. Select a base platform for your scribble machine. Mount your motor to the base.
4. Attach an item, such as a cork, to the shaft of the motor. Make sure it's on securely but not in the middle. Slightly offsetting the item will allow the machine to jitter around.
5. Mount your battery to your machine base within reach of the motor lead wires.
6. Attach markers to your base however you'd like as long as they easily touch the paper.
7. Remove the caps from your markers and stand your machine on your paper.
8. Connect your battery to the motor and watch your machine make shake and scribble!



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Troubleshooting Tips

- The offset weight helps transfer the rotational energy of your motor into linear energy for the entire scribble machine. Make sure not to center it perfectly.
- Motors are heavy. Use your battery to balance the opposite side of your machine if it falls over.
- If your machine is falling apart, try stronger fasteners. Use rubber bands, tape, or chenille sticks.
- Don't be afraid to try your offset weight in different positions on your motor and see the change in motion.



What happens if you add more markers?

How did you fasten your motor to your base?

Describe how your machine moves across the paper.

What is Happening?

- This activity is a great way of **upcycling materials** you have around the house. Reusing discarded objects or underused materials reduces waste, and gives new life to things you already have around you.
- Scribble machines depend on **cause and effect**, which is the relationship between events. One event (your machine moving and drawing) is the result of the other event (energy transfer via offset weight)). What combinations of action and reaction do you notice in your scribble machine?

Taking it Forward

- **Simple Robot “Programming”**
 - Try building multiple machines. How can you build each one to create different motions or accomplish different tasks? Changing the physical properties of the machine will change how it reacts.
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