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Making the future of young minds

# How To Make A Scribble Bot

## Educator Guide

## LESSON OBJECTIVES

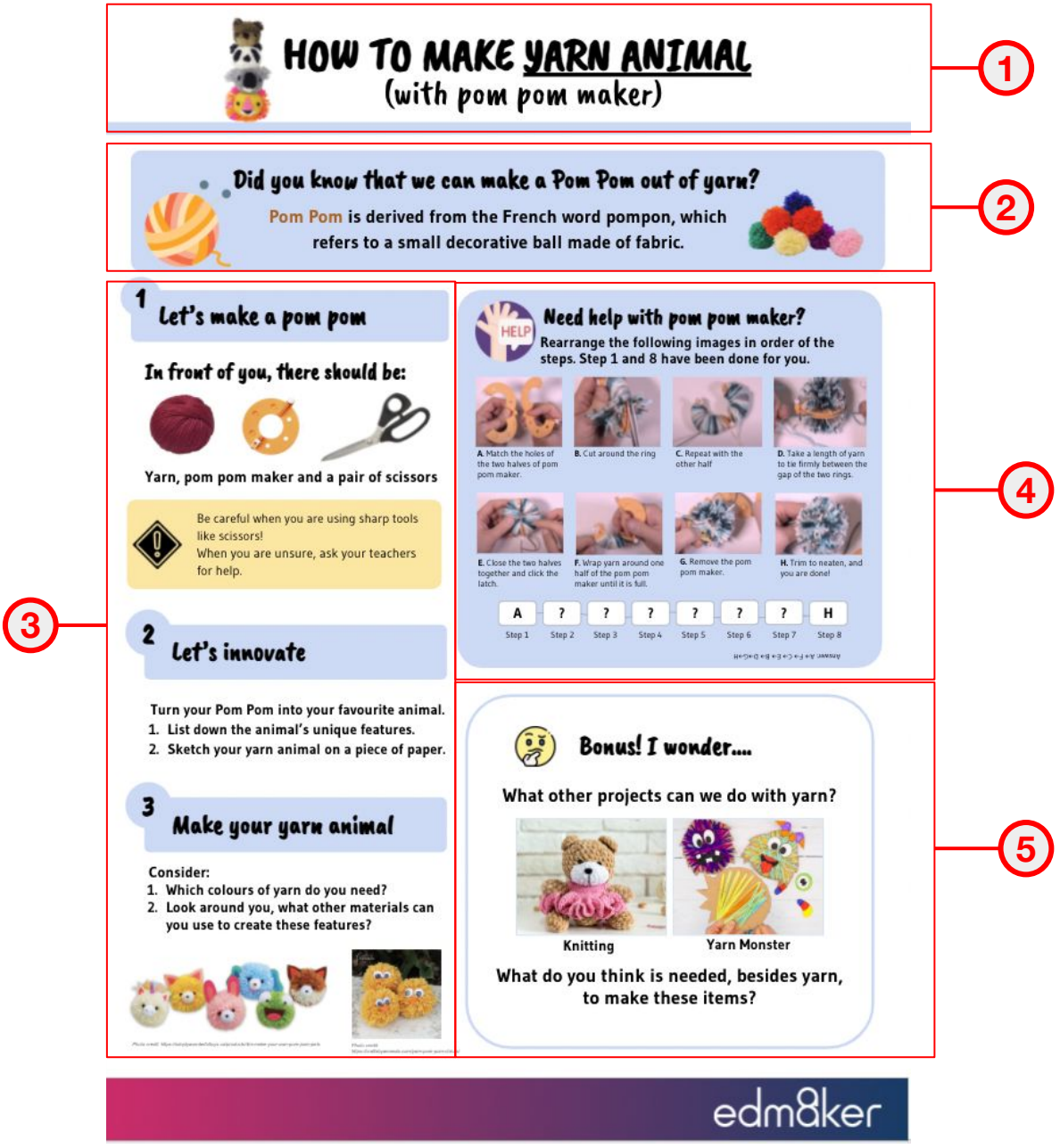
In this maker activity, students will learn how to

**01** Build a Simple Moving machine with a DC Motor

**02** Learn to Connect Electrical Components (Batteries and Motors) in an Electrical System

**03** Investigate physical properties of motion, exploring how attaching different weights to a motor changes the way a bot moves and draws.

# POSTER ANATOMY




1. This indicates the activity title.
2. This section serves as a little icebreaker to introduce and warm the students to the activity.
3. This section provides a starting point for the students. It is designed to be open-ended to encourage students to consider possible approaches. It is also numbered to allow students to find the flow of the activity.
4. This section provides guidance for students who may need extra help around the activity. It is marked with a hand-raise logo. It is designed to guide, while giving the students the opportunity to still figure it out themselves.
5. This section encourages students improve and developed their end product further by considering possibilities and breaching the 'Wide Walls'.

# SUGGESTED MATERIALS


## SDG 12: Responsible Consumption & Production

| SCRIBBLE BOT | |
|---|---|
| Suggested Materials | Per Student |
| Recyclable materials such as toilet roll and plastic cup | 1-2 |
| Decorative items such as googly eyes, pipe cleaners, | As needed |
| AA battery | 2 |
| Battery holder | 1 |
| DC motor | 1 |
| Markers | 3-5 |
| Masking tape/double sided tape | As needed |

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# SCRIBBLE BOT

| | |
|---|---|
| **Maker Activity** | How to make a scribble bot? |
| **Competencies** | Ideation, Prototyping and Testing |
| **Approach** | Facilitation Goal (To be chosen by the educator) |
| Tinker to Discover | Facilitating testing student's understanding i.e. after teaching the theory |
| **Subject Integration** | Art<br>Science (Introduction to Circuitry) |
| **SDG Goal** | SDG12: Responsible Consumption & Production |


| | Linkage | Guidelines/ Facilitation Tips |
|---|---|---|
| **What makes it a tinker to discover approach?** | The maker education approach is said to be a 'Tinker to Discover' approach if it meets the following considerations.<br>● Open-ended exploration<br>● Learner's autonomy or learner-driven activities. | Students will explore making a simple circuit to make their bot move and wiggle.<br>● Think creatively under constraints,<br>● Apply the subject topic knowledge for making |
| **Structures & Scaffolds** | Helps to recall their existing knowledge and apply it in a specific situation.<br>● How simple circuits work<br>● How to make their robot moves and wiggles.<br>● How to make their robot draws and makes pattern.<br>● How to make a vibration motor from a DC motor. | **The hook:** Get students to think which circuit will work.<br><br>**Maker Element:** Hands-on making of scribble bot<br><br>**Testing & Presentation:** Helps to demonstrate their knowledge and make the thought process explicit. |
| **Reference** | Video: How scribble bot works https://youtu.be/a6dTIJsMQHM | |

# SCRIBBLE BOT


| Part | Description |
|---|---|
| Define | Introduce the design challenge to the students: How would you design and create a robot that can autonomously scribble and draw on paper?<br><br>You may play this video: https://youtu.be/a6dTIJsMQHM to show Ss how a scribble bot works.<br>After watching the video, you may get Ss to make a drawing of what they understand about scribble bot and ask Ss questions such as<br>○ What do they understand about a scribble bot?<br>○ What are its **parts**?<br>○ What are the **purposes** of each of these parts?<br>○ What are its **complexities**? How are these related to each other? |

| Part | Description |
|---|---|
| Ideate | Some suggested prompting questions for students to think about when they are designing their scribble bot.<br>● What do you think a scribble bot is?<br>● What could it do? What could it look like?<br>● Do you want your scribble bot to move? How?<br>● How might you combine the materials available to make a scribble bot? |
| Make | Allow students to gather their materials and start making!<br>● Get students to consider these when they are making & testing their scribble bot.<br>○ In what way could it be made to be more **effective**?<br>○ In what way could it be made to be more **efficient**?<br>○ In what way could it be made to be more **beautiful**? |
| Share | Educator may prompt students to share their experiences.<br>○ What did you enjoy about this activity?<br>○ What is something that you noticed or learned?<br>○ How might you apply what you learned somewhere else? |

# ANNEX: POSTER

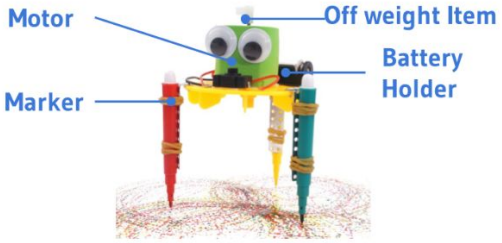
## HOW TO MAKE A SCRIBBLE BOT?

### DEFINE — Design Challenge

Design and create a robot that can autonomously scribble and draw on paper.

Scan the QR code to see the Scribble Bot in action!

### IDEATE — What is a scribble bot?




Scribble Bot is creative creation that uses markers,vibrating motors and or other components to create unique and colourful art.

### Let's think about it!

When designing your scribble bot, consider the following:

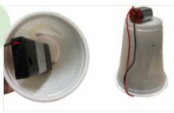
- What do you think a scribble bot is?
- What could it do? What could it look like?
- Do you want your scribble bot to move? How?
- How might you combine the materials available to make a scribble bot?

### MAKE — Building Your Scribble Bot!

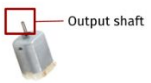
1 

Try making the motor spin. Can you also make it spin the other direction?

Motors and batteries have '**positive (+)**' and '**negative (–)**' ends. If connected one way, the motor will spin in one direction. If connected the other way, the motor will spin in the opposite direction.

2 

Attach the motor to the battery pack. Then attach it to the body of your scribble bot.

3 


How do you make your scribble bot spin, jitter, wiggle or vibrate? *(Hint: You can attach a weight to the motor's output shaft)*


What do you observe about Scribble's movement when the offset weight item is attached to different points on the output shaft?

4 

Attach Scribble's legs to his body using tapes

**DASH OF DESIGN**: Iteration is one o the key components in design thinking. Watch the video to learn more:

### SHARE — Share & Reflect!

Share your bot with us and participate in one of these scribble challenges:

**Circle Challenge**: Which group can draw the most circles or spirals?
**Most Artistic Bot Challenge**: Can you make a bot that will draw repeating patterns or eye-changing, artistic drawing?