

# 3Doodler Classroom Basics: Part 1

Forward, Doodle, Reverse

## Suitable Ages:

Suitable for ages 14+

## Skill Level:

Basic

## Materials Required:

- 3Doodler 2.0: 1 for every 2 students (recommended; can also deploy one for every two students)
- 3Doodler ABS strands: 1 strand per 3Doodler

## Duration:

~45 minutes

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# Objective

Following this activity, students will be able to identify the basic features and functions of the 3Doodler. They will insert and extrude a strand of plastic and write their name. After writing their name, they will reverse the plastic out of the 3Doodler and trim the melted end to prepare the plastic for reuse.

# Classroom Setup

The 3Doodler works best in a classroom setting when allocated to individual students or pairs of students.

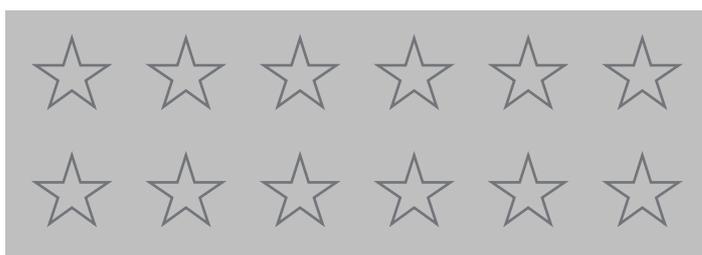
## Suggested Configurations

Two students (depicted here as stars, which they undoubtedly are), sharing one 3Doodler at a single desk:



N.B.: This configuration requires a power outlet at each desk or the use of the 3Doodler JetPack at each station.

Long workbench or table configuration (one 3Doodler per student):



This configuration simplifies the electrical configuration, allowing all 3Doodlers to be served by a pair of six-outlet power bars underneath or in the middle of the table.

Pairing students for initial explorations with the 3Doodler can aid in monitoring student progress and encourage collaborative learning.

# Warm-up

Using the provided handout and following along as a class, review the features of the 3Doodler and their respective functions. Have the students complete the **Anatomy of a 3Doodler** handout on page 10.

## Activity

Each student will receive one strand of ABS plastic. Turn on the 3Doodler using the appropriate setting: ABS & FLEXY: HI, blue LED; PLA: LO, green LED. Since this activity uses ABS, use the HI setting, which will cause the blue LED to shine.

Insert the strand into the Plastic Loader and double-click one of the buttons to begin continuous extrusion. Ensure that the strand is being drawn through the 3Doodler (give it a nudge if necessary), and the strand will extrude from the tip within 30-40 seconds.

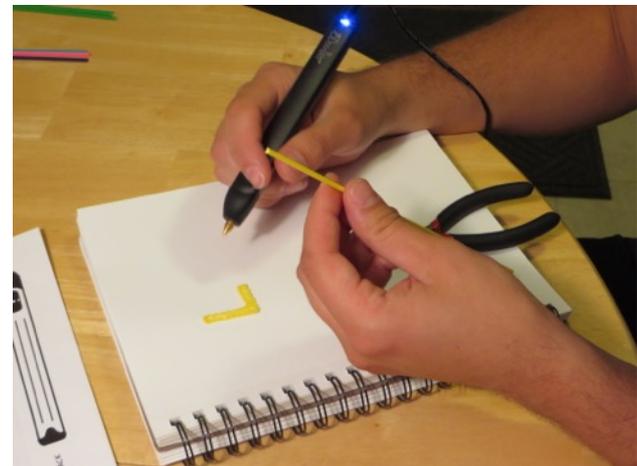
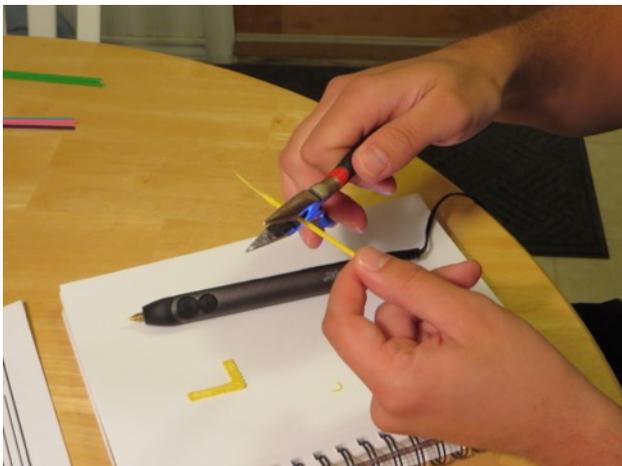
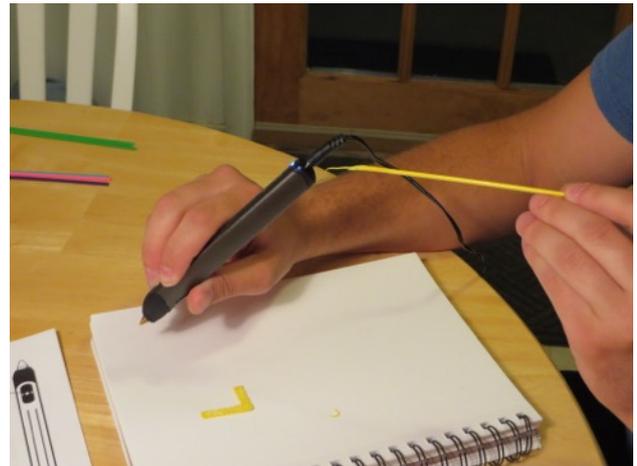
Press the tip down onto a sheet of standard notebook or copy paper so that the extruded plastic adheres to the paper.

Have each student Doodle the first initial of his or her name (nothing fancy, the point here is to perform the basic operations). **Tip:** move the tip of the pen at roughly the same speed at which the plastic is extruded for smooth, consistent lines.



After Doodling the first initial of his or her name, students will successfully reverse the strand from the pen by pressing both extrusion buttons simultaneously. Once the strand is no longer moving out of the pen, pull it clear of the 3Doodler and trim the melted end so that is clean and ready to be used again as shown below.

**Note:** Reinserting the melted end of a strand of plastic may result in blockages and/or damage to your 3Doodler.



# Sequence & Pacing

1. Using the hand-out on page 10, review the features and functions of the 3Doodler (10 min.)
2. Fill in the Anatomy of a 3Doodler handout (5 min.)
3. Each student will receive a strand of plastic and successfully insert, extrude, write their first initial, and reverse it out of the pen. Finally, trim the melted end for reuse (25 min.)
4. Exit Reflection- Discuss as a class what students found easiest/hardest about using the 3Doodler, share tips (5 min.)

# Striving Students

Paying close attention to these students will ensure safe use as well as readily available assistance. Grouping striving students with accelerated students can provide additional support.

# Accelerated Students

Grouping these students with striving students will give them an opportunity to provide assistance and encouragement to their fellow classmates, reinforcing the lesson for both parties. Accelerated students who complete the Doodling of the initial of their first name should be encouraged to write their entire name.

# Evaluation Strategies

Students will be graded according to a rubric on their attentiveness and participation as well as the completion of the **Anatomy of a 3Doodler** hand-out. Successful use of the 3Doodler will also contribute to the student's grade. The hand-out will be collected at the end of class and corrected for use as reference material for future lessons.

# Evaluation Rubric

	4	3	2	1
<b>Participation</b>	Students raise their hands to ask and answer pertinent questions. Follow directions. Stay on task.	Students raise their hands to ask and answer pertinent questions. Follow directions.	Students answer when called upon. Follow directions.	Students fail to engage in classroom discussion. Failure to follow directions/stay on task.
<b>Attentiveness</b>	Students are following along and paying close attention at all times.	Students are following along with the lesson.	Students need to be reminded of instruction due to lack of attention.	Students are not following along/ paying attention.
<b>Loading, Extrusion, Reversal, Trimming</b>	Safe and successful operation of the 3Doodler, and a handsome letter to boot!	Safe and successful operation of the 3Doodler.	Successful operation of the 3Doodler.	Failure to operate the 3Doodler.
<b>Anatomy of a 3Doodler</b>	All blanks are correctly filled in.	All blanks are filled in. Up to 2 mistakes.	All blanks filled in. Up to 4 mistakes.	Failure to fill in all blanks. More than 4 mistakes.

# 3Doodler Features & Functions

**Power Switch:** Located on the side of the pen, it is used to turn the pen to the HI or LO temperature settings, as well as OFF.

**Power Indicator Light:** Located to the rear of the 3Doodler logo, the Power Indicator Light will shine in three different colors when the pen is turned on. On both the HI and LO temperature settings, the light will start out red. This means the pen is heating up. When the 3Doodler reaches the proper temperature on the LO setting, the light will turn green. When it reaches proper temperature on the HI setting it turns blue. Only when the light is green or blue is the 3Doodler at the right temperature to melt the plastic, so the extrusion buttons only function when the light is green or blue.

When the 3Doodler is left turned on without pressing either button for five minutes, it has the safety feature of entering sleep mode. The light will turn red indicating that the pen is cooling down. It can be woken up from sleep mode by pressing either button. How long it was left idle will affect how long it takes to heat back up. **WARNING:** Just because the light is red doesn't mean the nozzle isn't HOT!

**Nozzle:** This is the tip of the 3Doodler, and the piece that heats up to melt the plastic. With the Nozzle Set accessory, you can swap in one of six different shaped nozzles in addition to the nozzle that comes standard on the 3Doodler.

**Power Port:** Looking at the back of the 3Doodler (where the eraser would be on a pencil), there is a hole on the right hand side if you look at it with the logo facing up. This is where you plug in your included power adapter or JetPack.

**Plastic Loader:** When looking at the back of the pen with the logo facing up, you will see a hole at the bottom, this is where you insert the 3Doodler plastic strands.

**Air Vent:** There are small holes covering the remainder of the back of the 3Doodler. These holes provide airflow to ensure that the plastic comes out at just the right temperature to solidify as quickly as possible. Make sure not to cover them up.

**Extrusion Control (fast):** This is the larger of the two buttons on the front face of the 3Doodler. With a gentle push you will feel the button click; not much pressure is needed to initiate extrusion.

**Extrusion Control (slow):** The smaller of the two buttons on the face of the 3Doodler, when clicked it extrudes plastic at a very slow and steady rate. It can be used to create very fine and precise detail and is also great for drawing up into the air!

**Extrusion Control (continuous):** Either button can be double-clicked to initiate a continuous extrusion without the need to hold the button down. While extruding in this mode, you can either click once to stop, or click and hold to pause. If holding the button down to pause, the 3Doodler

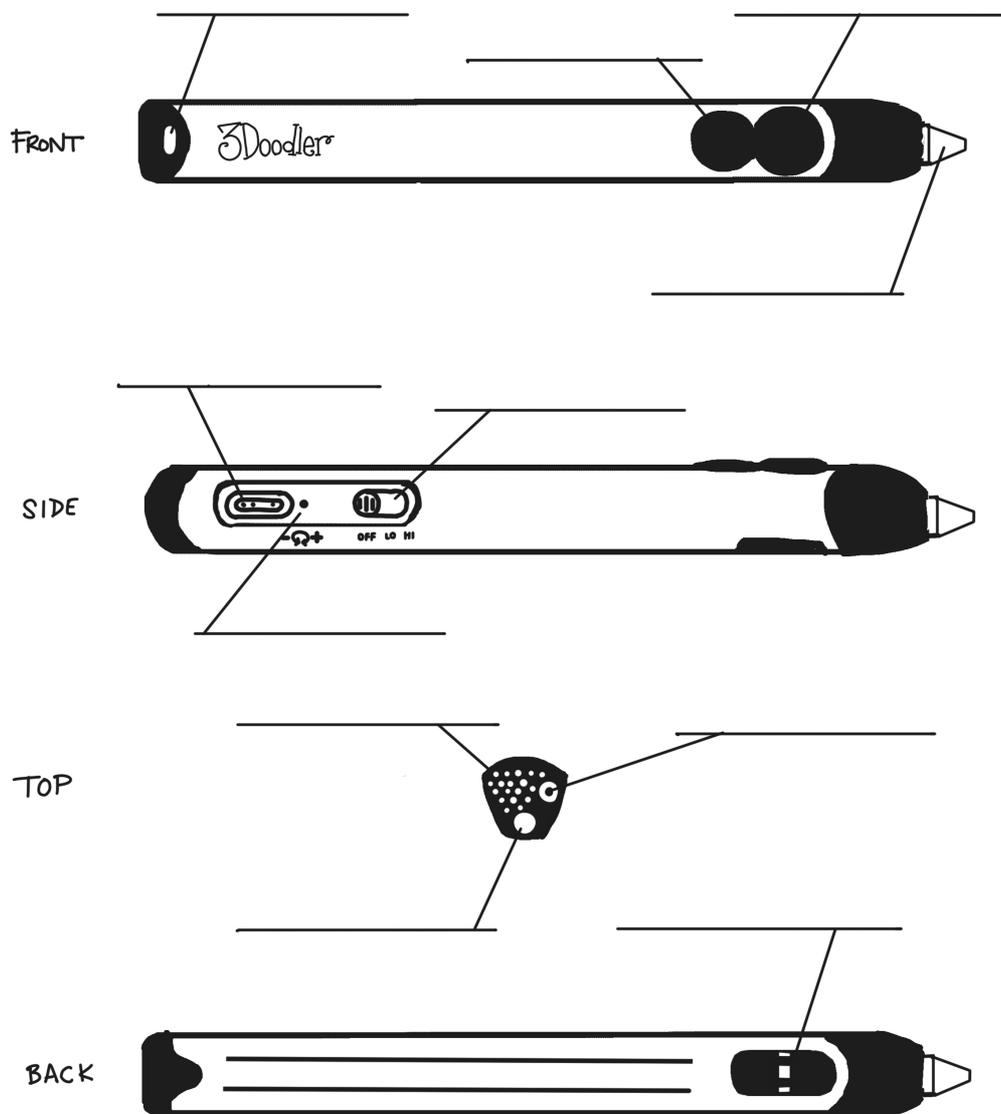
will stop extruding until the button is released. It will then resume continuous flow until the button is clicked once or paused again. Pressing both buttons simultaneously will reverse the plastic out of the 3Doodler.

**Temperature Control:** The small hole located next to the Power Switch can be used to adjust the temperature on either heat setting. Using the included mini-screwdriver, you can turn the heat up or down by a few degrees to reach the optimum plastic consistency. Turn it 90° to the right to crank up the heat, or 90° to the left to turn it down.

**Control Port:** On the side of the pen with the Power Switch you'll find the Control Port. It is a 3 pin port that can be used to attach 3Doodler accessories such as the foot pedal as well as to create your own hacks.

**Maintenance Cover:** In the unlikely event that with proper use plastic becomes stuck in your 3Doodler, refer to the user guide or videos at [the3Doodler.com/videos/#tips](https://the3Doodler.com/videos/#tips) to learn how to remove the Maintenance Cover and remove any blockages.

# Handout: Anatomy of a 3Doodler



Click and hold = \_\_\_\_\_

Double-click = \_\_\_\_\_

Double-click followed by single click = \_\_\_\_\_

Double-click followed by click-and-hold = \_\_\_\_\_

# Additional Resources

## Tutorial Videos

Please visit [the3Doodler.com/videos/#started](https://the3Doodler.com/videos/#started) to find videos demonstrating the skills required for this activity. Individual videos that will be useful include:

- **Inserting Plastic:**
  - YouTube: <https://www.youtube.com/watch?v=ZSmdhZEnMDE>
  - Dropbox: <https://www.dropbox.com/s/3jnmafuve2saqu4/Inserting%20Plastic.mp4?dl=0>
- **The Buttons:**
  - YouTube: <https://www.youtube.com/watch?v=mos2SBukObo>
  - Dropbox: <https://www.dropbox.com/s/cqkozrmhktr3u38/Buttons.mp4?dl=0>
- **Reversing Plastic:**
  - YouTube: <https://www.youtube.com/watch?v=aD84E55mgac>
  - Dropbox: <https://www.dropbox.com/s/mpzxcrky9f5aq41/Reversing%20Plastic.mp4?dl=0>

## Additional Inspiration

For additional inspiration and ideas about other simple projects that can be accomplished at this level, check out the following links:

- Stencils and Projects: [the3Doodler.com/community/](https://the3Doodler.com/community/)
- Doodles by You: [the3Doodler.com/doodles/](https://the3Doodler.com/doodles/)
- Videos: [the3Doodler.com/videos/](https://the3Doodler.com/videos/)
  - Getting Started: [the3Doodler.com/videos/#started](https://the3Doodler.com/videos/#started)
  - Tips & Tricks: [the3Doodler.com/videos/#tips](https://the3Doodler.com/videos/#tips)

## 3Doodler/EDU

More curricular materials are available at [the3Doodler.com/education/](https://the3Doodler.com/education/).

If you have additional ideas for classroom activities or lessons, feel free to reach out to us at [education@the3Doodler.com](mailto:education@the3Doodler.com)!