

3D Printer Badge: Dremel 3D40

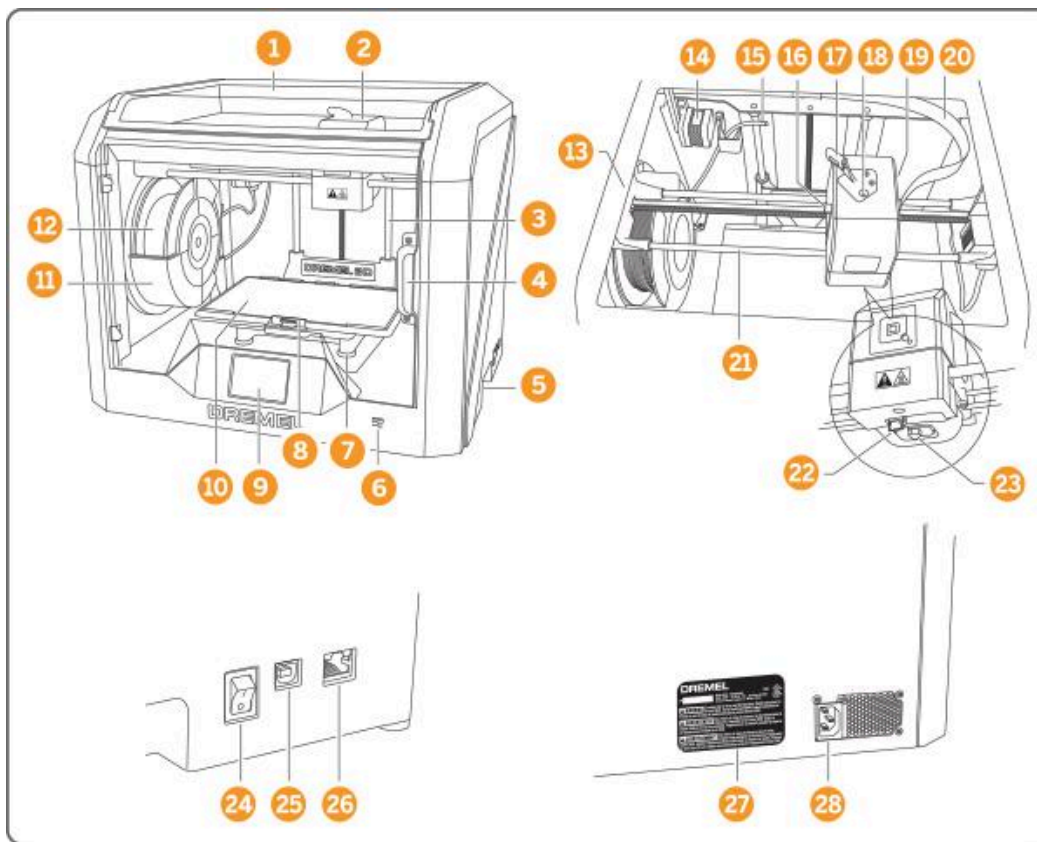
Age: Grade 6-Adult

LEVEL 1

Objectives:

- To learn the basic functions of the 3D printer.
- To print an object from the USB Drive.
- To print from the Dremel DigiLab 3D software.
- To change the filament with supervision.

1. Identify parts of printer and their functions



1. Lid
2. Extruder
3. Z-Axis Guide Rail
4. Door
5. Gripping Handles
6. USB A Port
7. Leveling Knobs
8. Build Platform Clips
9. Touchscreen
10. Build Platform
11. Filament Spool Holder
12. Filament Spool
13. Y-Axis Guide Rail
14. Stepper Motor
15. Filament Guide Tube
16. Extruder Lever
17. Filament Guide Clip
18. Extruder Intake
19. Extruder Fan
20. Ribbon Cable
21. X-Axis Guide Rail
22. Leveling Sensor
23. Extruder Tip
24. Power Switch
25. USB B Port
26. Ethernet Port
27. Nameplate
28. Power Input

1. Lid—Clear hinged top of the device. Gently lift for inside access.

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2. **Extruder**—Draws the filament from the spool, melts it, and pushes it through the nozzle onto the build plate.
3. **Z-Axis Guide Rail**—Moves the build platform up and down.
4. **Door**—Clear window on front of device. Open and close to remove build platform or printed objects.
5. **Gripping Handles**—Allows one to carry the printer if necessary.
6. **USB A Port**—Insert a flash drive here to upload print files to the Dremel.
7. **Leveling Knobs**—These four knobs located beneath the build platform allow for minor adjustments to its height.
8. **Build Platform Clips**—Keeps the build platform in place during the printing of an object. To remove the platform press forward on the front clip.
9. **Touchscreen**—Digital interface is used to access the menu. Click “Tools” to access preheat options. Click “Level” to adjust the build platform level. Click “Filament” to load a new spool of filament into the extruder intake.
10. **Build Platform**—This is a removable plate that the object is printed upon.
11. **Filament Spool Holder**—Keeps the filament spool in place during the printing process.
12. **Filament Spool**—Spool of PLA plastic used to make objects.
13. **Y-Axis Guide Rail**—Moves the extruder forward and backward.
14. **Stepper Motor**—Small motor used to power different parts of the printer.
15. **Filament Guide Tube**—Plastic tube that guides the filament from the spool to the extruder.
16. **Extruder Lever**—Used to loosen the grip of the extruder gear motor.
17. **Filament Guide Clip**—Holds unspooled filament in place before it enters the extruder intake.
18. **Extruder Intake**—Draws the filament into the extruder.
19. **Extruder Fan**—A fan used to cool the outer assembly of the extruder and gear motor.
20. **Ribbon Cable**—Transmits power and data to the extruder.
21. **X-Axis Guide Rail**—Moves the extruder right and left.

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- 22. Leveling Sensor**—Detects the height of the build platform and assists in proper leveling.
- 23. Extruder Tip**—Nozzle at the bottom of the extruder that heats up to 220 degrees Celsius, allowing for an even distribution of filament.
- 24. Power Switch**—On and Off switch for the printer.
- 25. USB B Port**—Place to connect the USB cable to a computer running the Print Studio software.
- 26. Ethernet Port**—Allows the Dremel to have a wired internet connection.
- 27. Nameplate**—Specifies the Model and Serial Number of the Dremel 3D40.
- 28. Power Input**—Power cord is plugged into the power input.

OTHER TERMS:

Flash Drive—Contains free Dremel approved model files.

.STL File—Commonly used file format for 3D models.

Build Tape—Blue painter’s tape that protects the build platform and optimizes the building process.

Object Removal Tool—Gently separates objects from the build platform.

2. Safety Guidelines

- Use only Dremel PLA plastic filament.
- Always print with both the top lid and the door closed.
- The extruder is HOT (220 degrees Celsius). Carefully remove object after a print.
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3. Prepare the Build Platform

- Press down on the front center build platform clip to remove the plate.
- Affix blue painter’s tape on the surface covering most of the build platform. Make sure the tape is entirely level with no holes or air bubbles.

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4. Turn ON and preheat the printer

Attaching the Power Cable

- Ensure that the power switch on the Dremel is set to the OFF position.
- Insert the power cable into the power input on the back of the Dremel.
- Plug the power cord into an electrical outlet. Now you may plug the USB cable into the computer if you are using it to print.
- Set the power switch to the ON position.
- The Dremel 3D Printer will display options “Build,” “Filament,” “Level,” and “Tools” on the Touch Screen.

Preheating:

- Manually preheat the Dremel by selecting “Tools” on the Touch Screen. Then select “Preheat.” The thermometer on the Touch Screen will rise to 220 degrees Celsius.

5. Complete a print job from the flash drive

- Insert your flash drives with print files into the USB-A port.
- From the Touch Screen, go to “Build” and select the USB option.
- Scroll through the selection of preloaded print jobs.
- Choose a file and select “Build.”
- The machine will begin the job once the extruder has reached the optimal temperature.
- When finished printing, carefully remove the object from the build plate. Caution: the extruder is HOT.

6. Cool down/ shut down

- DO NOT power off the printer without allowing it to cool off.
- The top-right corner of the Touch Screen will communicate the printer temperature with a thermometer icon. Red is hot, orange is warm, blue is cool. After a build is complete, you will hear a fan running. It should take about 10 minutes for the machine to reach a safe temperature for powering down (Warm).

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- It is now safe to turn the power switch at the back of the printer to the OFF position (O).

Making an object from the Dremel DigiLab 3D software

1. Connect the 3D printer to a computer

Attaching the USB Cable

- Locate the USB-A to USB-B cable. Insert the USB cable into the USB-B port on the right side of the Dremel. Do not attach the other end of the USB cable to anything until the power cable is plugged in.
- Attach the power cable and turn the power switch to ON (I).
- Plug the USB-A end of the cable into the computer's USB port.

Turn on the MakerLab Laptop

Username: maker

Password: 1maker1

2. Find and download a 3D file

Browse these websites to find 3D designs to print:

- Thingiverse: www.thingiverse.com
- Cookie Caster: <https://cookiecaster.herokuapp.com>
- NASA: <https://nasa3d.arc.nasa.gov/models>
- Fossils: www.africanfossils.org
- Dremel 3D: 3dprinter.dremel.com/3d-printing-models

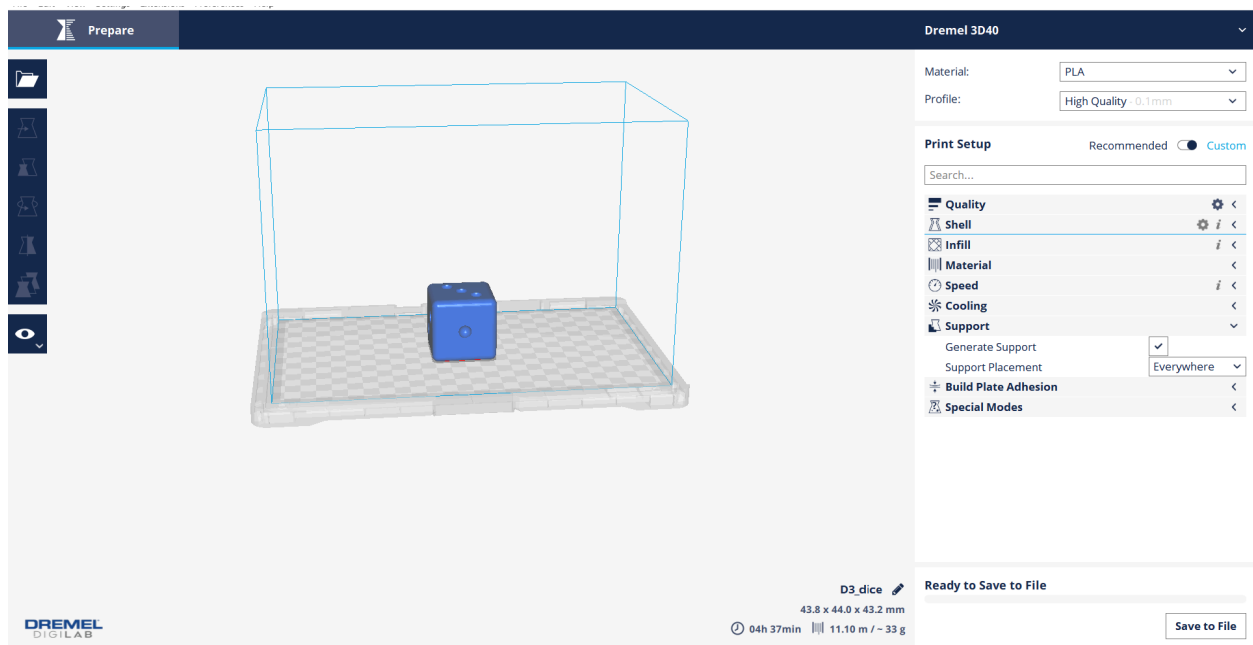
Start by making a Die. Go to www.thingiverse.com and search “Dice” by AndrewSerra. Download the Dice STL file and save it to the “Maker: Downloads” folder.

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3. Open Dremel DigiLab 3D Slicer

- Add your .stl file to the software. You can either open it from the Downloads folder or you can click and drag the item straight to the virtual DigiLab build plate.
- Before you can adjust any model, you must select it by highlighting it. You can move your model on the build plate, scale it, rotate it, and mirror it. You can also view it in different forms. **To shorten the print-time for the Dice, reduce the size to 75%. It should take 13 minutes to print.**
- Once your item is ready, make sure a USB drive is inserted, and click “Save to Removable Drive”
- Then insert the USB drive into the 3D printer, click “Build” and then on the USB drive symbol. Pick the file you would like to print and click on “Build”.



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Legend:



Open File

Move - Reposition your model on the build plate

Scale - Adjust the size of your model.

Rotate - Make sure to lay your model flat

Mirror - For flipping over the model

Per Model Settings - For customizing the model settings

View Mode - Solid, X-Ray or Layers

4. Print an object using the Print Studio software

- Click “Import.”
- Find and select the STL file that you wish to print.
- Use the sidebar icons to make any necessary adjustments to your model.
- When ready, click “Print.” Click SAVE if the software prompts you save the file to a “.g3drem” format. The file will be saved in the desktop folder “Dremel Prints.”

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- The Touch Screen will display Downloading File and begin printing after the extruder is heated.
- When finished printing, carefully remove the object from the build plate. Caution: the extruder is HOT.

6. Change the plastic filament

- Select “Filament” on the Touch Screen.
- As the extruder is heating, lift lid and use scissors to cut the filament about 2 inches above the extruder.
- Turn the handle on the left side of the printer counterclockwise and remove.
- Remove the filament spool from holder.
- **On the spool you are removing, make sure to thread the filament through the spool hole**, so the filament doesn’t get tangled up in the spool.
- Thread new filament all the way through the filament guide tube. Place new filament reel onto the spool holder, making sure to feed the filament from the bottom up towards the back of the Dremel, NOT from the top of the reel.
- Once the extruder is fully heated. Hit “Next” on the touchscreen. The old filament still in the extruder will begin to be purged.
- Hit “Next” and you will be prompted to feed the filament. Load the end of the new filament through the extruder guide and into the extruder intake, then hit “Next” again until it is pulled through. Any old filament will continue be extruded out.
- When the new filament’s color is extruding, hit “Done” on the Touch Screen.
- Replace left side handle and turn clockwise. Handle should firmly snap into place.

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LEVEL 2

Objective:

- *Learn troubleshooting tips and independently demonstrate Level 1 procedures to earn the 3D printer badge.*
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1. Troubleshooting Tips

- **Cancel a build in progress**
Press the Stop button on the Touch Screen. Cancel Build? Press “Yes.”
- **Will not print?**
From the USB Drive: check that the flash drive is inserted properly.
From the laptop: disconnect and reconnect the USB cable.
- **Clicking sound?**
Means plastic spool is hung up. Adjust it.
- **Filament not extruding?**
Check the extruder nozzle, remove all clumps. This does not work? Reload the filament.
- **IMPORTANT:** If the machine is malfunctioning, please notify the desk staff immediately. If no trained MakerLab staff are available to troubleshoot the issue, please turn the machine OFF and leave a detailed note with the desk staff about the issue.
- **Dremel Support:**
3dprintersupport.dremel.com
Scroll down the screen to “Frequently Asked Questions”

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2. Successfully demonstrate the Level 1 procedures to the staff member supervising your training at a MakerLab session

- See Dremel 3D Printer procedures for Level 1

3. Sign the MakerLab Agreement

4. Print the 3D Printer badge

Congratulations! You are now ready to operate the Dremel 3D printer independently and to demonstrate the functions of the printer to MakerLab visitors!

Learn More on Your Own

3D DESIGN SOFTWARE

- Dremel 3D: 3dprinter.dremel.com/3D-printer-software-apps
- SketchUp: sketchup.com
- Tinkercad: tinkercad.com
- List of 3D design tools: shapeways.com/creator/tools

TECHNICAL SPECIFICATIONS

Dremel 3D printer

Model: 3D40