Custom 2D art on a 3D printer

<table>
<thead>
<tr>
<th>Tools, materials, technologies used:</th>
<th>Experience level required:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D modeling software like Gravit (optional)</td>
<td>intermediate</td>
</tr>
<tr>
<td>online svg converter</td>
<td>beginner</td>
</tr>
<tr>
<td>3D modeling software like Tinkercad</td>
<td>beginner</td>
</tr>
</tbody>
</table>

**Grade Level** (of this example): 3-12

**Content Standards:** All core areas - See below for possible content exploration

**Summary of Project:** Students will use or design a 2D image to make a 3D printed relief item. The image should be personally and/or academically meaningful.

At its simplest, this project is an ideal introduction to the 3D printer. It requires no actual design as long as students have a high-contrast picture at hand that can be easily converted to a vector file on PicSvg.com. Students simply load their .svg into Tinkercad and can use simple sizing and shape tools to create a printable cylinder.

![Left to right: (1) hand drawing (2) drawing converted to SVG using picsvg.com, (3) SVG uploaded and modified in Tinkercad, (4) after 3D printing.](image)

For richer learning through custom modeling, see **Possible Content Explorations** below. These will all demand thoughtful design, using a 2D modeling program like Gravit and research/discussion about your target content.

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Alternative method for more complicated drawings - hand tracing to create SVG:

Left to right: (1) hand drawing (2) drawing traced over by hand in Gravit and exported to SVG, (3) SVG uploaded and modified in Tinkercad, (4) after 3D printing

Possible Content Explorations

- **ELA or Social Studies**
  - choose or create symbol that represent a character or important theme
  - design a logo for a social group in history, modern society, or a work of literature
    - a meeting or a service project for relevant social group might be an ideal way to present work - what about communicating with Native American advocacy groups to reworking sports teams names and logos that misuse Native imagery?
  - community collaboration - offer logo design and screen printing services for a group that has community ties to a student or to the school. Can tie in with exploratory chemistry project (below)
    - sports team logo design
    - sale/display of stamps and prints at a community or school event, with research-based student artists’ statements on display

- **STEM: High School Biology**
  - 3D print animal feet to use as prints* / create a “footprint roller”
  - replication/mutation - give all students one starting shape, have them each change one line segment in a design using 2D modeling software
  - combine with molding activity, have students design enzyme/substrate pairs with “lock-and-key” fit
    - have students design a model of an inhibitory drug that blocks enzymes or substrates from binding with each other as usual

- **STEM: Chemistry**
  - use 3D figure as printing block* with “disappearing” ink

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Resources

- With some fine tuning to create a flat surface, the printed figure may be used as an ink stamp or a clay imprint. Resources for smoothing your 3D prints:
  - 3 ways to smooth PLA - overview
  - Detailed step-by-step 3D print smoothing - best for high school
  - Product: Epoxy for smoothing PLA
  - Smoothing ABS with Acetone - ONLY ATTEMPT IN FUME HOOD WITH SUPERVISED TEENS - see your chemistry teacher for help and encouragement!
  - Product: rubberized coating to create stamp surface