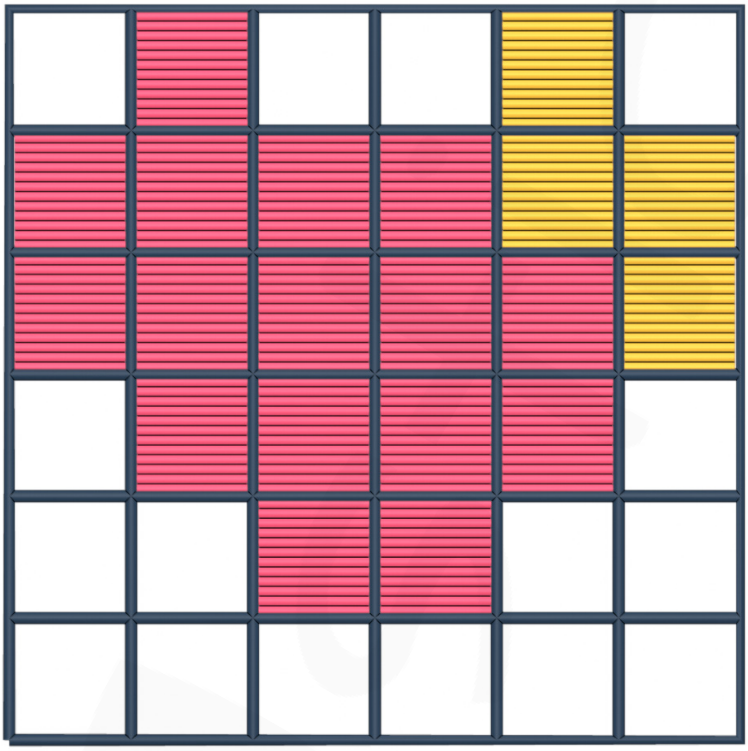
MAKE • DISCOVER • COLLECT

Pixel Picture

Ages 8 and up, in accordance with the conditions of use for the specific pen and with the necessary adult support. • About 40–65 minutes, at your own pace



Your own flat picture made from a connected 6 × 6 grid and colored, fully filled cells. The example shows a two-color heart, while the participant chooses their own motif, colors, and open background.

Your outcome

Turn your own simple motif into a composition of square cells.

Construction illustration. The instructions show the successive stages. Full-size (1:1) templates are supplied on a separate sheet.

What you need

Additional items are needed. Prepare the complete list below before starting.

Basic set

☐	PLA-compatible 3D pen and its stand Settings and color changes according to the instructions for the specific device.	**1 set**
☐	1.75 mm PLA filament Choose any PLA colors. The quantities below are for the example heart with 20 filled cells; for your own design, use the conversion factor.	**Colors according to your own plan**
☐	Standard transparent pad for a 3D pen Suitable for PLA; place the template under it. All paths are supported.	**1 piece**

To print

☐	Printed 1:1 grid template Print at 100%, without fitting to the page; check the 20 mm reference segment.	**1 sheet**

Filament — amounts include extra

☐	PLA 1.75 mm — dark navy — 6 × 6 grid with border	**1.4 m · ≈ 4.2 g**
☐	PLA 1.75 mm — coral — 16 cells of the example heart	**2.3 m · ≈ 6.9 g**
☐	PLA 1.75 mm — gold — 4 cells of the example heart	**0.6 m · ≈ 1.8 g**

Project extras

☐	Graph paper For planning a motif in six rows and six columns.	**1 sheet**
☐	Colored pencils For marking the selected cells and colors before working with the pen.	**1 set**
☐	Ruler with millimeter markings For checking the 20 mm reference segment on the 1:1-scale printout.	**1 piece**

Total filament: 4.3 m · approximately 12.9 g

The quantities include extra filament. Grams indicate estimated net filament mass, excluding packaging.

Before you start

Pad and support

Place the template under a standard transparent PLA pad. Make the grid and fills flat on it. Do not apply PLA directly to the paper.

Pen and hot material

Use the device according to its instructions. Do not touch the tip or fresh PLA; place the pen on its stand. Adapt adult assistance to the device and participant.

PLA for the example heart

Example heart: 1.4 m of dark navy PLA for the grid, 2.3 m of coral for 16 cells, and 0.6 m of gold for 4 cells. 4.3 m total for the grid and 20 filled cells. The quantities include a 50% allowance and rounding up to 0.1 m.

PLA for your own design

For your own design, use a conservative estimate of approximately 0,14 m of PLA for each filled cell. Count the cells separately for each selected color, multiply their number by 0,14 m, and round the result up to 0,1 m. Add 1,4 m for the grid; if the grid and cells are the same color, add these quantities together.

This is a conservative estimate that depends on the path width and the number of color changes.

1. On graph paper, mark out six rows and six columns. Color your own motif: a heart, an initial, or another simple symbol. Decide which cells will remain open. You can change the plan while working.
2. Choose the PLA colors. The illustrations guide you through making a heart; you will make your own motif using the same cell-filling technique.
3. Print the template at 100% scale and check the 20 mm reference segment. Place it under the transparent PLA pad on a stable work surface. The light 5/10 mm grid on the sheet is only a planning aid — do not trace it. The actual model consists of the dark square plus five vertical and five horizontal lines from pattern W01.
4. Prepare the pen and stand according to the device instructions. Provide the working conditions and adult assistance required by those instructions.

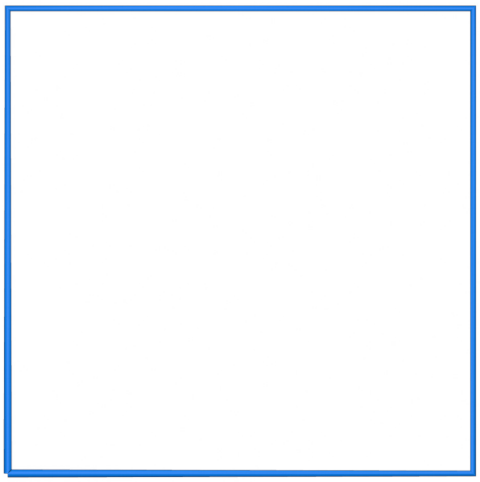
The estimated time includes planning, making the grid, filling, color changes, cooling, and showing the finished piece. It depends on the number of selected cells and the working pace; there is no time limit. The estimate has not been verified in a practical trial.

How to read the instructions

The large image shows the completed stage. Small views show the action and current parts. ×N means repeat the whole action N times, cooling and checking each time. Illustrations are not at 1:1 scale.

STAGE 01 / 04 • Session 1

Close the frame



Closed perimeter

NOW 6 × 6 grid with perimeter

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × 6 × 6 grid with perimeter · PLA | template W01

→ T001 • Techniques — reference appendix

On the pad over the template, trace a square. Join the end of the path to its beginning; at this stage, make only the perimeter.

Check

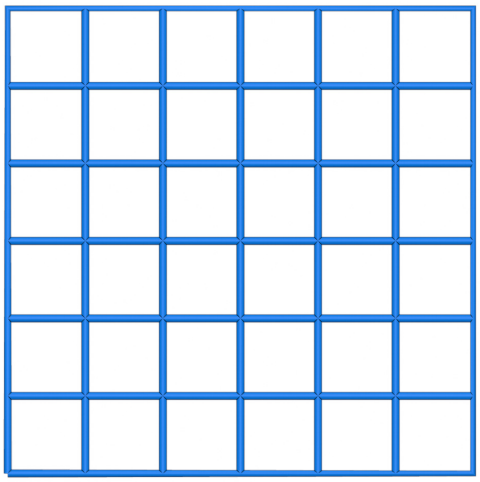
The perimeter is closed and lies flat.

If it does not work

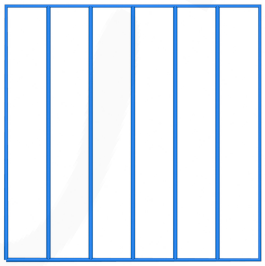
Close the gap with a short strand joining both ends.

STAGE 02 / 04 • Session 1

Build the 6 × 6 grid



Five horizontal lines of the actual grid — 36 model cells



Five vertical lines of the actual grid inside the dark perimeter

NOW 6 × 6 grid with perimeter

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × 6 × 6 grid with perimeter · PLA | template W01

→ T001 • Techniques — reference appendix

Inside the completed frame, add five vertical lines, then five horizontal lines. Join the beginnings and ends of the lines to the frame, and use fresh PLA to join every intersection. Work flat on the mat throughout.

✓ **Check**

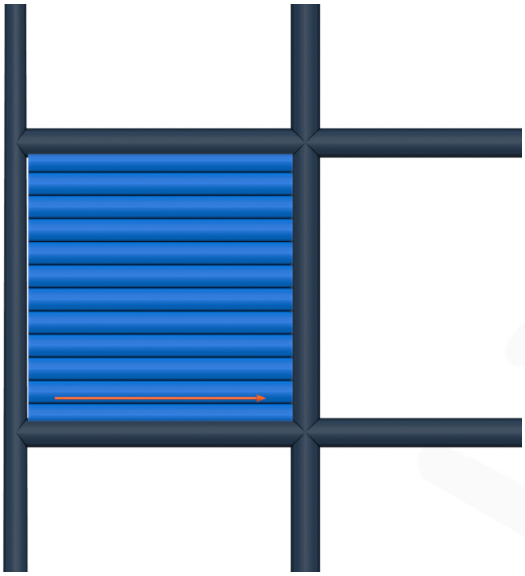
The grid has six rows and six columns. The lines are joined at every intersection.

If it does not work

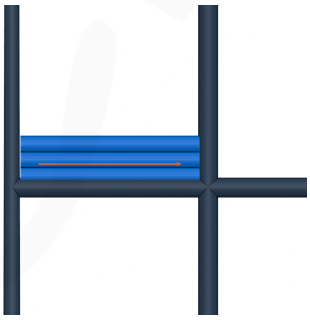
Complete a missing joint with a short path at the intersection.

STAGE 03 / 04 • Session 1

Fill the first pixel



Entire cell filled



Three adjacent strands

NOW Coral motif cells

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Coral motif cells · PLA | template follow the written method

→ T002 • Techniques — reference appendix

On the mat, lay three back-and-forth strands in the selected cell. Join them to one another and to the bottom and side edges of the grid. Add strands upward: make about 10 strands in total, including the first three, at a width of approximately 1.3 mm in a cell with a clear width of 13.25 mm.

Adjust the number to cover the cell; join the last one to the top edge.

Check

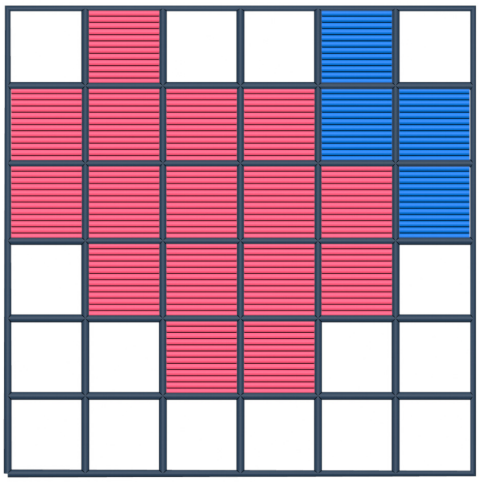
The entire cell is covered with no gaps, and the strands are joined to one another and to all four edges of the grid. The color does not extend into neighboring cells.

If it does not work

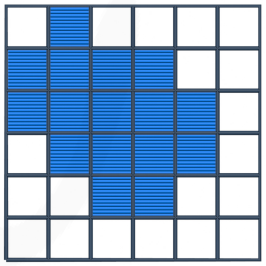
Fill any visible gap with a thin path; do not flood the adjacent cell.

STAGE 04 / 04 • Session 1

Compose your own picture with colors



The second color completes the picture



The first color builds the motif

NOW Coral motif cells · Gold motif cells

Blue / dark emphasis: the part used in this action. Arrows: visual guides. Illustration not to scale.

PARTS FOR THIS STAGE

1 × Gold motif cells · PLA | template follow the written method

→ T003 • Techniques — reference appendix

Fill the remaining cells according to your plan using the same technique. Change PLA colors according to the pen instructions. The example heart has 16 coral and 4 gold cells; the remaining cells form the open background. Leave the picture flat until it has cooled completely. Lift it, name it, and display it or give it as a gift.

Store the cooled picture flat, away from heaters and strong sunlight.

✓ **Check**

One flat picture has been created. The filled cells hold onto the grid, and the motif can be pointed out or named.

If it does not work

Repair a loose edge on the mat: join both edges with a short strand of the same PLA. Leave the picture flat until it has cooled completely before lifting it again.

Finished — check the outcome

Check
The grid has six rows and six columns and a closed perimeter.

Check
The selected cells have colored coverage made from connected strands; the background may remain open.

Check
After cooling completely, the work is one connected picture.

Check
The participant names the work, points out their own choices, and displays or gives the picture as a gift.

Storage
Store the model in a cool place away from sunlight and heat. Repair it on a suitable 3D-pen work surface using the same material as the part.

Techniques — reference appendix

T001 • Stage 1 · Stage 2

1 × 6 × 6 grid with perimeter · PLA | template W01

On the pad, make the perimeter, then five vertical lines and five horizontal lines. Join each line to the perimeter and to the lines it crosses. Finished cross-section [mm]: 1.5 × 1.5. Number of layers: 1. Support: The entire grid lies on the standard transparent pad over the 1:1 template.

Strand direction: Perimeter, five vertical lines, five horizontal lines. Join the ends to the perimeter and connect every intersection. Cooling: Leave flat until completely cool before lifting. Tip access: Approach the grid from above with the pen tip. Place the pen on its stand; do not touch fresh paths.

T002 • Stage 3

1 × Coral motif cells · PLA | template follow the written method

Fill the selected cells with one layer of adjacent PLA strands, joining them to one another and to the grid. Start with one cell; then repeat the technique in the remaining cells. Finished cross-section [mm]: 1.3 × 1.3. Number of layers: 1. Support: The paths lie on the pad inside the already completed grid, not in midair.

Strand direction: One layer of about 10 short strands in total, laid back and forth from the bottom edge of the cell toward the top. The clear cell width is 13.25 mm; at a strand width of approximately 1.3 mm, the first three strands count toward that total.

Adjust the number to the actual width: cover the entire cell with no gaps, join adjacent strands to one another and to all four edges of the grid, without entering neighboring cells. Cooling: Leave the picture flat until completely cool. Change colors according to the device instructions.

Tip access: Guide the tip from above over the open cell, lifting it when moving to the next cell.

T003 • Stage 4

1 × Gold motif cells · PLA | template follow the written method

After changing the PLA color, fill the selected cells using the same technique of joining the strands and edges. Finished cross-section [mm]: 1.3 × 1.3. Number of layers: 1. Support: The paths lie on the pad inside the already completed grid, not in midair.

Strand direction: One layer of about 10 short strands in total, laid back and forth from the bottom edge of the cell toward the top. The clear cell width is 13.25 mm; at a strand width of approximately 1.3 mm, the first three strands count toward that total.

Adjust the number to the actual width: cover the entire cell with no gaps, join adjacent strands to one another and to all four edges of the grid, without entering neighboring cells. Cooling: Leave the picture flat until completely cool. Change colors according to the device instructions.

Tip access: Guide the tip from above over the open cell, lifting it when moving to the next cell.