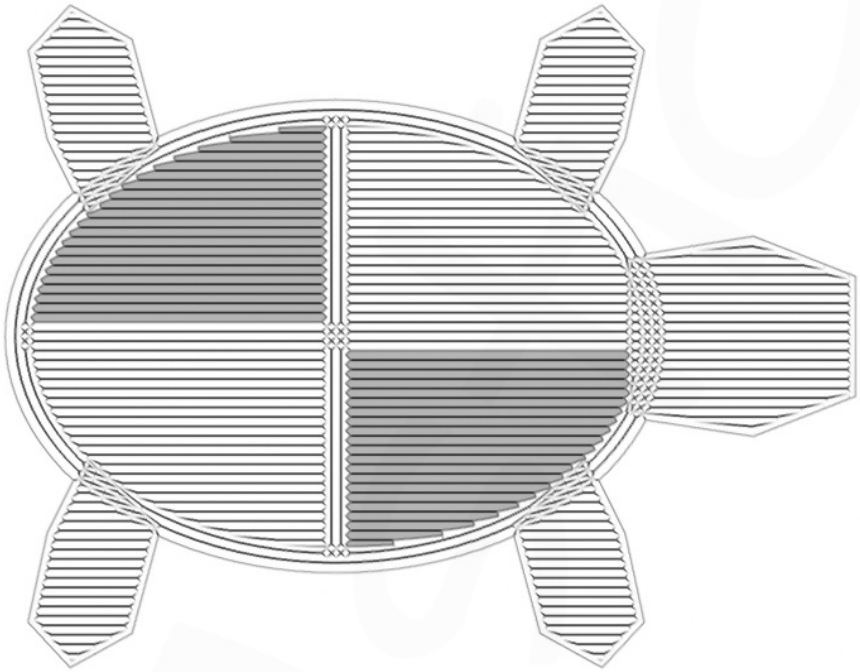
MAKE • DISCOVER • COLLECT

Mosaic-shell turtle

Beginners of different ages; assistance matched to skills and device instructions. • About 22–38 min of pen work; 32–55 min total. An estimate, not a time limit.



Flat 9 × 7 cm turtle with four large shell panels, a head, and four legs. Two colors of one PLA, one color change. After cooling, check that it can be moved as one piece with no loose panels.

Your outcome

Join the outline to the colored panels and keep the piece integral.

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

What you need

A 3D pen, the selected filament and equipment available in your workspace. See the complete list below.

Equipment

☐	PLA-compatible 3D pen	**1 pc.**
☐	Transparent flexible mat for the pen	**1 pc.**
☐	W01 printout on A4 paper	**1 sheet**
☐	Ruler with mm scale	**1 pc.**

Filament — amounts include extra

☐	PLA 1.75 mm — A — your color (example: green)	**2.4 m · ≈ 7.2 g**
☐	PLA 1.75 mm — B — your color (example: yellow)	**1.1 m · ≈ 3.3 g**

Total filament: 3.5 m · approximately 10.5 g

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

Before you start

PLA and colors

Use the PLA diameter specified for the device. The stated allowance is for 1.75 mm filament. Choose two contrasting colors of one PLA: A for the frame and two panels, B for the other panels.

Mat and pattern

The mat must be intended for use with the chosen pen and allow W01 to remain visible. Use the ruler only to check the printout.

Material estimate

Lengths and masses are estimates. They include a transition strand outside the model and one allowance of at least 50%, rounded up; the actual amount used for the color change depends on the pen.

1. Print W01 at 100% scale, with no fit-to-page scaling. Measure the check line: it must be exactly 20 mm. If it differs, correct the settings and print again.
2. Orient the printout with the turtle's head on the right. Place the paper on a flat table and the transparent mat on top. The entire pattern must be supported.
3. Prepare two colors of the same PLA. Start with color A. Start and operate the device according to its instructions; plan one change to B.
4. Work with assistance matched to your skills and the device guidance. Set the pen down as instructed; do not touch the hot tip or fresh PLA.

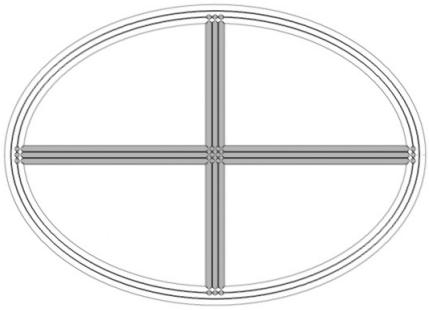
Editorial estimate, without a physical test. Preparation: 3–5 min; pen work: 22–38 min (including extrusion during the color change and spot repair); color change: 2–4 min; cooling, removal, and inspection: 4–6 min; cleanup: 1–2 min. Actual cooling time depends on execution.

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 / 05 • Session 1

Build the frames for the four panels



Frame and two dividers

Three fused strands along half of the oval

Closed wide frame

NOW Turtle · shared A/B template

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

PARTS FOR THIS STAGE

1 × Turtle · shared A/B template · PLA | template W01

Shared W01 shows the whole turtle. Use color A for the outline, dividers, head, legs, and A sections; fill the B sections only after the single color change. Bond each new strand side-to-side with the previous one in a single layer.

Choose two PLA colors: A and B. On shared W01, the letters—not the gray lines—determine the color. Begin with A on W01, checked at 100% scale. Work flat on the mat throughout. Lay three adjacent strands along the upper half of the oval, bonding their sides. Continue around the lower half to close the outline.

Make the horizontal and vertical dividers from three strands as well. Bond every end to the frame. At the crossing, join to the side of the existing junction; do not run a strand over it. The result is one layer, about 1.2 mm thick, with frames about 3 mm wide.

✓ **Check**

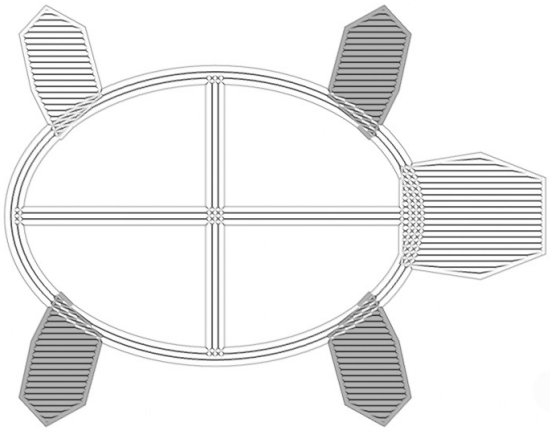
The oval is closed. The four large panels share continuous, gap-free frames.

If it does not work

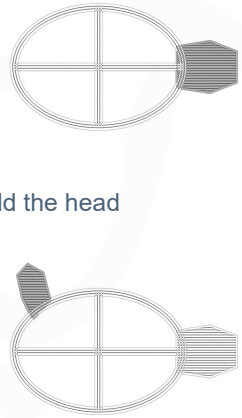
Fill gaps with fresh PLA against the strand sides, always on the mat.

STAGE 02 / 05 • Session 1

Add the head and four legs



Repeat for the other three legs



Add the head

Example of one leg

NOW Turtle · shared A/B template

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

From the right side of the shell, draw the head outline as shown in W01. Fill it with short strands side by side and fuse the whole base to the side of the frame. Make the first upper-left leg the same way: outline from frame to frame, fill it, and fuse the base across a wide area. Repeat for the other three legs.

Keep everything on the mat in the same layer. At the frame, run fresh PLA up to its side; do not cover the finished edge from above.

✓ **Check**

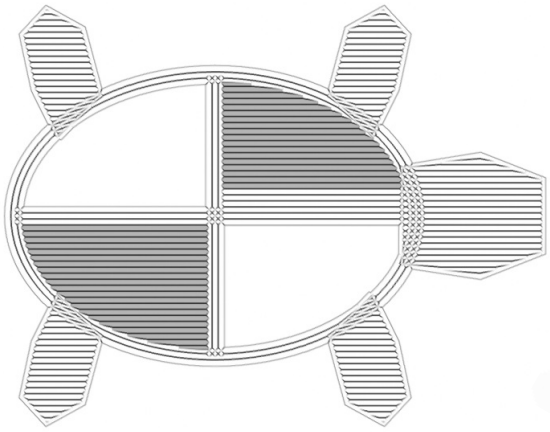
Both dividers from stage 1 remain inside the shell. One head and four legs connect to the shell through wide, solid bases. No mat is visible through the bases.

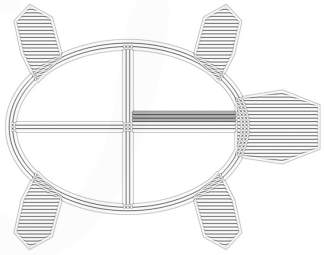
If it does not work

Fill the gap at the supported base. Do not replace it with a connection at the tip of a single strand.

STAGE 03 / 05 • Session 1

Fill two sections with color A





Example of three fused strands

Repeat across the entire upper-right and lower-left sections

NOW Turtle · shared A/B template

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

In the upper-right section, start at the center divider. Lay short strands from one frame to the other and fuse both ends to their sides. Lay each next strand right beside the previous one; fuse them along their full shared length. After the three strands shown, repeat until you reach the curve.

Fill the entire lower-left section the same way. Close the last short strands at the outline. Leave the other two sections empty.

✓ **Check**

In the two opposite sections, no mat is visible between the strands. The fill is attached to the frames along the whole edge.

If it does not work

Close any gaps and strand ends with color A before changing color.

STAGE 04 / 05 • Session 1

Change color and start section B

Schemat techniki, nie stan modelu: jedna zmiana A na B zgodnie z instrukcją długopisu; pasmo przejściowe poza żółwiem na macie.

PARTS FOR THIS STAGE

1 × Upper-left B panel · PLA | template follow the written method

After the single color change, fill the section with bonded strands against the frames, in the same plane. Each strand is about 1.2 mm wide and 1.2 mm thick. Finished cross-section [mm]: 1.2 × 1.2. Support: The entire panel on the flat mat, inside the existing frames.

Strand direction: From the cross-divider toward the panel edge, lay short adjacent segments between the frame and divider. Cooling: Keep the entire turtle on the mat until cool; do not lift the fresh panel. Tip access: Access from above, with the tip over the mat beside the existing PLA.

Keep the turtle flat on the mat. Following the pen instructions, change from A to B of the same PLA. Extrude the transition strand onto a clear area of the mat, away from the turtle. Once color B flows evenly, make the first three strands in the top-left section next to the divider.

Bond their sides to the A frames and to each other, without adding a second layer.

✓ **Check**

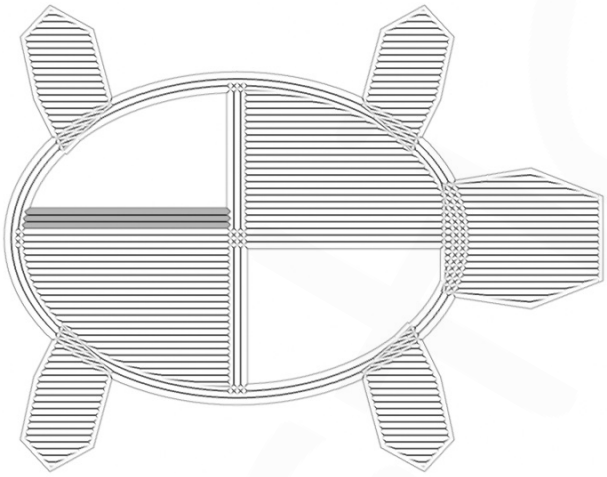
All three B strands are bonded at both ends to the A frame and side-to-side to each other.

If it does not work

Fill any gaps at the joins with B. Remove the transition strand outside the model only after it has cooled.

Change color and start section B — construction details

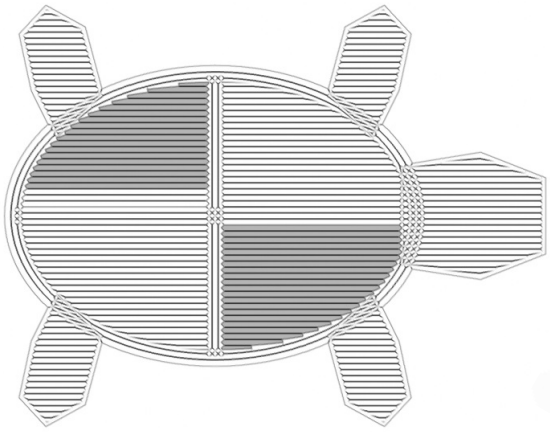
Stage outcome



Example of the first three B strands

STAGE 05 / 05 • Session 1

Finish the B mosaic



Finish both remaining B sections

NOW Lower-right B panel · Upper-left B panel

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

PARTS FOR THIS STAGE

1 × Lower-right B panel · PLA | template follow the written method

After the single color change, fill the section with bonded strands against the frames, in the same plane. Each strand is about 1.2 mm wide and 1.2 mm thick. Finished cross-section [mm]: 1.2 × 1.2. Support: The entire panel on the flat mat, inside the existing frames.

Strand direction: From the cross-divider toward the panel edge, lay short adjacent segments between the frame and divider. Cooling: Keep the entire turtle on the mat until cool; do not lift the fresh panel. Tip access: Access from above, with the tip over the mat beside the existing PLA.

Continue the bonded strands to the edge of the top-left section. Fill the entire bottom-right section the same way. Close each final strand against the frame curve. Do not switch back to A. Leave everything flat until fully cool. Use the finished turtle as a decoration.

✓ **Check**

All four large sections are filled; the frames, strands, and wide bases form one flat turtle. Once cool, it can be moved as one piece.

If it does not work

Close any gaps in B; use B for spot repairs as well, without a second color change.

Finished — check the outcome

Check
The complete flat turtle has a target overall size of 9 × 7 cm, including the head and legs.

Check
The four large panels have short strands fused to the frames and adjacent strands.

Check
The head and four legs are integrally joined to the shell.

Check
Once fully cool, the model can be moved as one piece; all sections remain within the shell.

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.