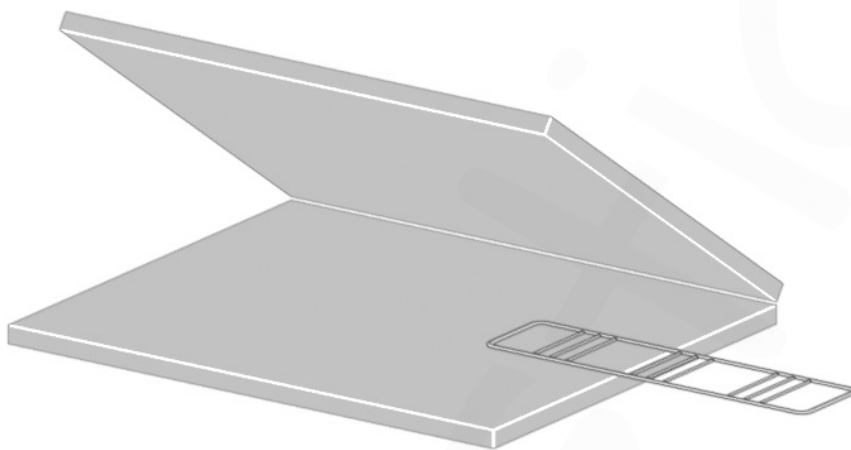


MAKE • DISCOVER • COLLECT

Bookmark with your own rhythm

Beginners of different ages • About 20–35 min, including 10–20 min of pen work; no time limit.



Make a flat 12 × 3 cm bookmark from PLA: a double frame and three bands of short crossbars. Choose a simple rhythm, repeat it, and after it cools, test your small item between the pages of a book.



Your outcome

Make a personal small item while practicing an even line and a repeating pattern.

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.

tools

- | | | |
|--------------------------|---|--------------|
| ☐ | 3D pen for PLA with power supply and stand
One per participant; operate according to the instructions for the specific device. | 1 pc. |
|--------------------------|---|--------------|

workstation

- | | | |
|--------------------------|--|--------------|
| ☐ | Flexible mat for tracing with a 3D pen
Designed for hot PLA; allows the pattern underneath to remain visible and be traced, and the mat to be flexed when removing the cooled work. | 1 pc. |
|--------------------------|--|--------------|

preparation

- | | | |
|--------------------------|---|--|
| ☐ | Pattern printed on plain A4 paper
Scale 100%, with no fit-to-page scaling; the pattern and test area are on one page.
The paper is placed under a suitable mat. | 1 sheet per person |
| ☐ | Ruler with millimetre markings
For checking the 20 mm segment and the final dimensions; an available ruler may be used. | 1 pc. per workstation or shared for checking the printout |

test

- | | | |
|--------------------------|--|--------------|
| ☐ | Book for testing
For inserting the bookmark, gently closing the book, and finding the marked place. | 1 pc. |
|--------------------------|--|--------------|

Filament — amounts include extra

- | | | |
|--------------------------|----------------------------------|------------------------|
| ☐ | PLA 1.75 mm — Selected PLA color | 0.5 m · ≈ 1.5 g |
|--------------------------|----------------------------------|------------------------|

Total filament: 0.5 m · approximately 1.5 g

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

Before you start

Hot tip

Use the device according to its instructions. Do not touch the tip or fresh PLA. Always place the pen on its stand. Children work under adult supervision.

The book is for testing

Keep it away from the hot-work area. Insert the bookmark only after it has cooled completely and has been inspected.

Thin and flat

Lay the outlines next to each other. Do not add a second layer over the entire frame, and do not press the bookmark with the book to straighten it.

- 1 Print W01 at 100% scale; use a ruler to check the 20 mm segment. Place the pattern under the flexible mat for tracing hot PLA, flat on a stable worktop. Put the book away from the hot-work area. Choose one rhythm for all three bands. Start the pen according to its instructions.
- 2 Prepare the items on the list. Place the flexible mat on a stable worktop, away from its edge. Print pattern W01 at 100% scale and use a ruler to check the 20 mm segment. Place the pattern under the flexible mat intended for tracing hot PLA. Choose the rhythm shown: three evenly spaced crossbars or a near-far arrangement.

Repeat the same choice in each of the three bands.
- 3 Ages 8 and up - the coordinator's decision for this activity. The instructions for the specific pen take precedence, including when they require a higher age. Children work under adult supervision.
- 4 Make the line test in the test area outside the bookmark. Time and extra PLA have been allowed for it.



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 / 08 • Session 1

Prepare the work and test the line

„Stop feeding at the end“

Test one line

NOW 20 mm PLA test line

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

PARTS FOR THIS STAGE

1 × 20 mm PLA test line · PLA | template follow the written method

Draw along the pattern on the mat in one pass. Lay down the strand at a consistent height; at the end, stop feeding without leaving a blob.

Draw a 20 mm test line with no blob at the end; place the pen on its stand. As a guideline, cool the sample for at least 5 minutes, or longer as required by the device and mat instructions.

Without touching the PLA, an adult checks whether warmth can still be felt a few centimeters above the sample; if warmth is present or there is any doubt, keep waiting.



Check

The control segment measures 20 mm; the mat lies flat. After checking that it has cooled, the sample is continuous, low-profile, and has no large blob.

If it does not work

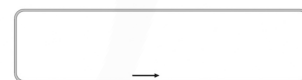
Incorrect scale: print again. Gaps or lumps: adjust the drawing movement according to the device instructions and repeat the test in an unused area.

STAGE 02 / 08 • Session 1

Draw the two frame outlines



Second strand next to the first



Join the end to the start

Draw the outer outline

Add the second outline

NOW Double flat frame

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

PARTS FOR THIS STAGE

1 × Double flat frame · PLA | template W01

On the mat, trace the outer and then the inner closed outline of the complete pattern. Make each outline in one pass, without a blob; the strands touch side by side in one layer.

On the supported mat, draw the outer outline in one pass, moving smoothly around the corners. Finish the line without a large blob. Then draw the inner outline right next to the first, at the same height and touching it side by side. Do not draw a second layer over the first. Both outlines remain flat on the mat.

The pattern defines the outer dimensions as 120 × 30 mm.



Check

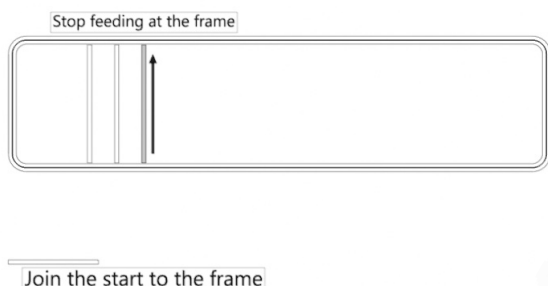
After phase 1 there is only the outer outline; after phase 2, two low outlines form a continuous frame with no gap or blobs.

If it does not work

Repair a gap with the minimum amount of PLA on the mat. Allow the repair to cool; do not flatten the hot frame with your fingers.

STAGE 03 / 08 • Session 1

Make the first band



Band 1: crossbar 1



Join the start to the frame

Band 1: crossbar 2

Band 1: crossbar 3

NOW First band

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

PARTS FOR THIS STAGE

1 × First band · PLA | template follow the written method

Trace three separate lines of the selected rhythm, one at a time. Draw each one on the mat from one inner edge of the frame to the other; join the ends without a blob, and do not connect the end of one line to the start of the next.

On the mat, draw the three crossbars of the first band in sequence, following one selected rhythm: equal or near-far. Each crossbar is a separate single pass; at its end, stop feeding and move to the start of the next. Join the start and end side by side with the inner outline.

The entire line and both joints lie on the mat; the pen approaches from above. Do not draw over the frame or add an extra connector between the crossbars.



Check

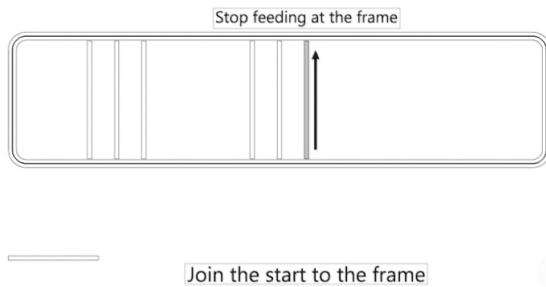
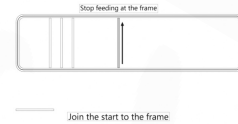
The phases show 1, 2, and 3 crossbars. All three join the frame at both ends; the selected rhythm is clear.

If it does not work

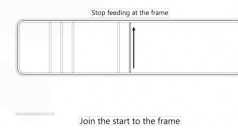
Repair a missing joint locally while the entire piece lies on the mat; allow the repair to cool. Do not add another layer over the entire band.

STAGE 04 / 08 • Session 1

Repeat the rhythm in the second band



Band 2: crossbar 1



Band 2: crossbar 2

Band 2: crossbar 3

NOW Second band

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

PARTS FOR THIS STAGE

1 × Second band · PLA | template follow the written method

Trace three separate lines of the selected rhythm, one at a time. Draw each one on the mat from one inner edge of the frame to the other; join the ends without a blob, and do not connect the end of one line to the start of the next.

On the mat, make the three crossbars of the second band in the same order and rhythm as in the first. Draw each in a separate single pass from a side joint with the inner frame to the opposite joint; stop feeding at the end. The complete lines and both ends are supported, and the tip approaches from above.

Do not overlap the bands onto the frame or connect them with an extra line.

✓ Check

The second band grows from 1 → 2 → 3. At the end there are two complete bands with the same rhythm and six crossbars joined to the frame.

If it does not work

Repair a local missing joint on the mat with the minimum amount of PLA and let it cool. If the rhythm differs, compare it with the selected pattern variant before continuing.

STAGE 05 / 08 • Session 1

Complete the third band



Band 3: crossbar 1



Band 3: crossbar 2

Band 3: crossbar 3

NOW Third band

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

PARTS FOR THIS STAGE

1 × Third band · PLA | template follow the written method

Trace three separate lines of the selected rhythm, one at a time. Draw each one on the mat from one inner edge of the frame to the other; join the ends without a blob, and do not connect the end of one line to the start of the next.

On the mat, make the three crossbars of the third band in sequence, keeping the selected rhythm. Draw each as a separate single pass, connecting both ends laterally to the inner outline. The tip approaches from above, and the line and joints are supported. Stop feeding between the lines; do not add connectors or a top layer.

After the last line, place the pen on its stand. After placing the pen on its stand, leave the PLA flat on the mat for at least 5 minutes as a guideline; leave it longer if required by the device or mat instructions.

Without touching the PLA, an adult checks whether warmth can still be felt a few centimeters above the entire work and the joints. If so, or if there is any doubt, keep waiting. Elapsed time alone does not confirm that it has cooled.



Check

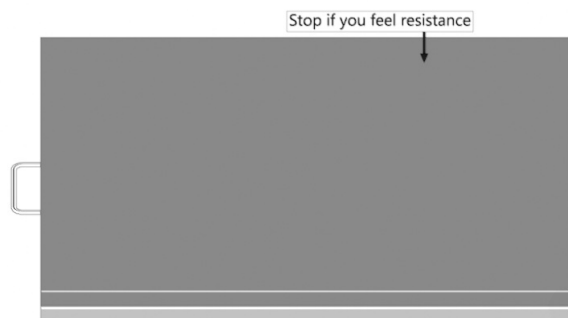
The third band grows from 1 → 2 → 3. The complete piece has nine crossbars, 18 joints with the frame, and one repeated rhythm; it still lies on the mat.

If it does not work

Fill only the missing supported joints and allow the repairs to cool. Do not remove or bend the warm bookmark.

STAGE 06 / 08 • Session 1

Insert the bookmark and close the book



Slide between the pages

Check gentle closing

NOW Double flat frame · First band · Second band · Third band · Upper block of pages with cover

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

After it has cooled completely, move the bookmark by holding the frame, not the crossbars. Before first use, inspect both sides: the bookmark should be flat, with no sharp ends or loose joints. If anything needs correcting, do it on the mat, let it cool again, and inspect it.

Slide the inspected, cooled bookmark between the pages of the open book, without forcing it or catching the paper. Gently close the book with its cover. Observe whether a thickened area spreads the pages apart. Do not press the bookmark with the book to flatten it.

✓ Check

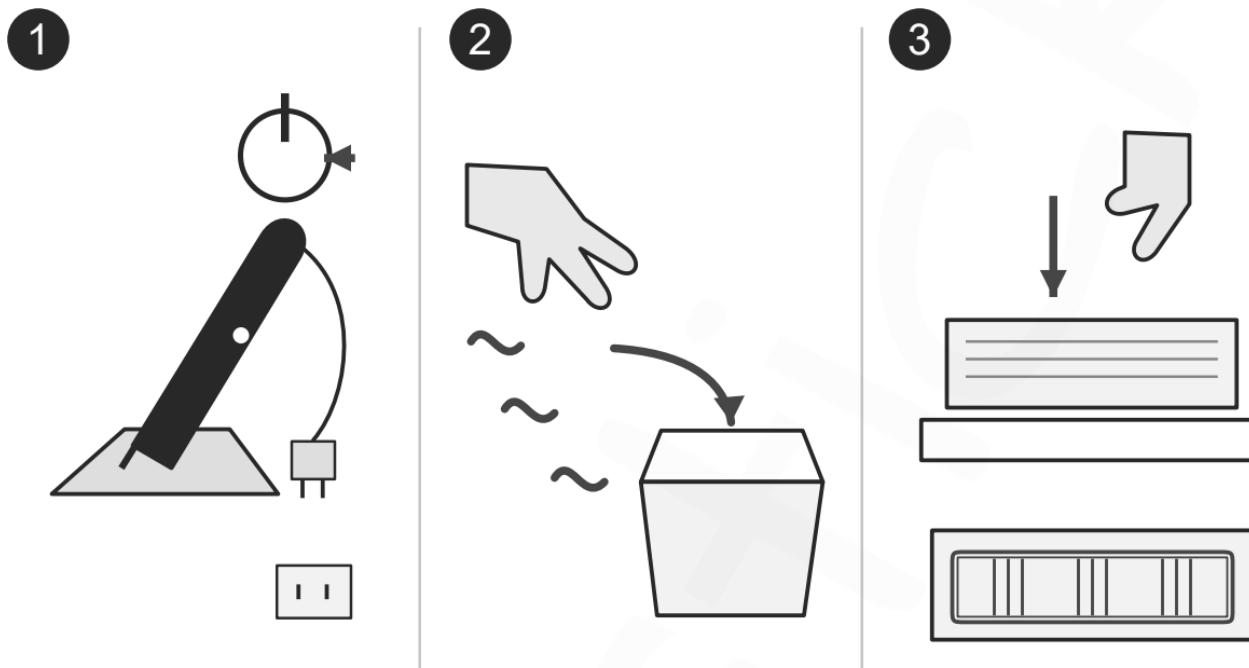
The bookmark slides in freely; the book closes without forced pressure and without noticeably spreading the pages.

If it does not work

If anything catches or spreads the pages, open the book and remove the bookmark. Return to the inspection outside the book; after a repair on the mat, the bookmark must cool again and undergo the complete test.

STAGE 07 / 08 • Session 1

Open, remove, and finish the work



1 → 2 → 3

Open the book, remove the bookmark without tugging, and check the edges and pages. Compare the three bands: the chosen rhythm should repeat. Turn off the pen according to its instructions; leave it on the stand to cool, then put it away. Collect the cooled scraps and sample. Put away the book, pattern, and mat.

Keep the bookmark after a successful test. Store the bookmark flat in a cool place, away from sunlight and heat sources.



Check

The bookmark comes out without snagging, loose ends, or sharp excess material; the pages remain intact. The device is switched off and has cooled before being put away. The worktop is tidy.

If it does not work

Repair a loose joint outside the book, on the work mat, using the same PLA. Let it cool completely again, inspect it, and repeat the entire test in the book. Do not use a sharp or damaged bookmark.

1 — switch off the device and leave it to cool; 2 — collect only cooled scraps; 3 — put the items away and store the bookmark flat. Diagram not to scale.

Open, remove, and finish the work — construction details

Finished bookmark after inspection

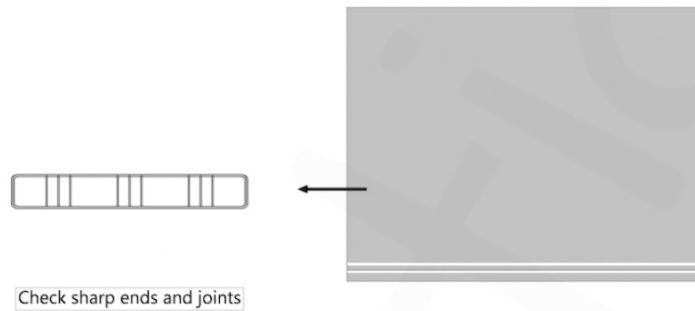


Open at the marked place



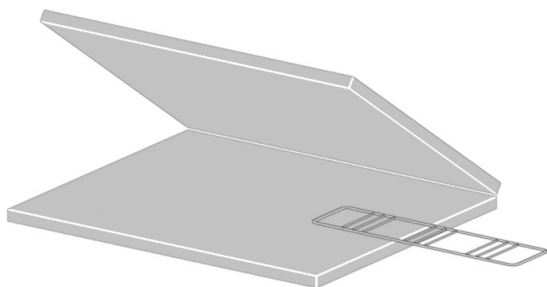
Open, remove, and finish the work — construction details

Find the place and assess the result



STAGE 08 / 08 • Session 1

Mark the page for your next reading



Mark the page for your next reading

NOW Double flat frame · First band · Second band · Third band

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

Open the book to the page you want to return to. Place the end of the cooled bookmark on it; leave the rest extending beyond the edge of the book.



Check

The end of the bookmark lies on the selected page, and the rest extends beyond the book.

If it does not work

If the bookmark is on a different page, move it to the selected page without pressing it down.

Finished — check the outcome



Check

The bookmark has a 12×3 cm outline, two connected frame lines, and exactly three bands of three crossbars.



Check

It is one flat piece, with no loose ends or sharp blobs.



Check

Insertion and removal proceed without catching or forcing movement.



Check

The book closes gently without noticeable local spreading; after the test, the pages show no signs of catching or creasing.



Check

The selected rhythm can be recognized in each band; small differences support self-reflection and are not formally assessed.

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.

View from different sides

View 1



View 2

