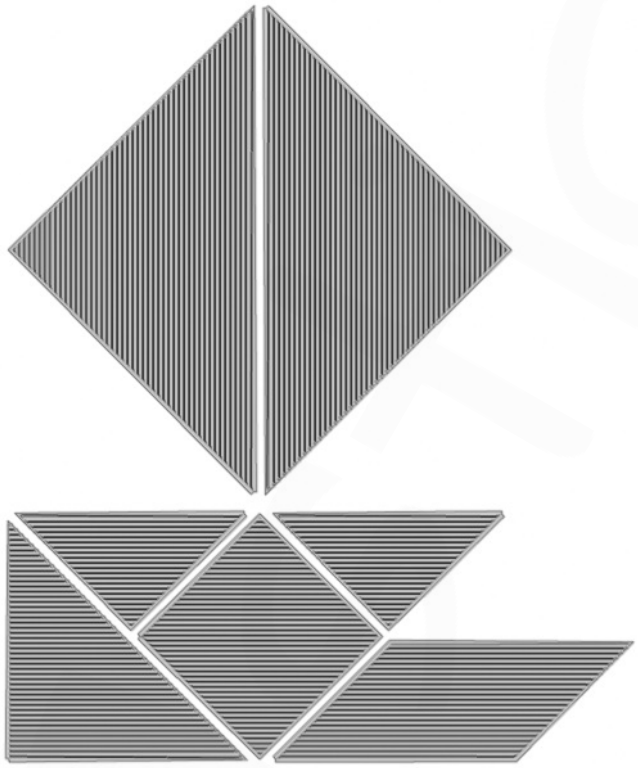
MAKE • DISCOVER • COLLECT

Seven-Piece Tangram

Ages 10+; children work with an adult and follow the instructions for the device they are using. • About 35–70 min of pen work and 55–100 min in total. This is an estimate, not a limit.



Make seven fully filled PLA pieces at one scale. Arrange a square on the 90 × 90 mm pattern, a cat and a sailboat, then create your own pictures.

Your outcome

Build a puzzle that can form many different pictures.

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.

device

☐	3D pen for 1.75 mm PLA	**1**

preparation

☐	Transparent sheet included in the kit, suitable for use with PLA and at least A4 size.	**1, at least A4 size**

patterns

☐	A4 paper: T01–T03	**3 pages**

check

☐	Ruler	**1**

Filament — amounts include extra

☐	PLA 1.75 mm — PLA colour of your choice	**6.1 m · ≈ 18.3 g**

Total filament: 6.1 m · approximately 18.3 g

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

Before you start

1. Use a ruler to check the 20 mm segment on each of the three sides printed at 100%. Place T01 under a transparent mat on a flat, stable tabletop. Ask an adult to help.
2. Place T01 under the transparent sheet included in the kit on a flat, stable worktop.
3. Prepare PLA in colours of your choice. Do not touch the hot nozzle. Ask an adult for help and use the settings in the pen instructions.
4. The pattern is visible through the mat, and the surface does not move.
5. If the 20 mm measurement does not match, correct the print scale. Do not draw directly on the paper.

The estimate includes making seven pieces, letting them cool completely and arranging them. The working pace may vary.

How to read the instructions

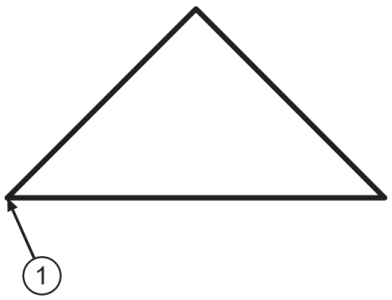
The large image shows the completed stage. Small views show the action and current parts. ×N means repeat the whole action N times, cooling and checking each time. Illustrations are not at 1:1 scale.

STAGE 01 / 04 • Session wykonanie i zabawa — szacunek bez limitu lekcyjnego

Build a fully filled piece

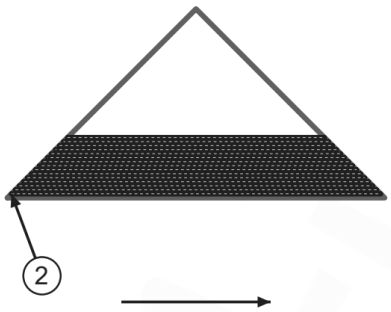
K01 • L1: outline → first strands → full coverage

A01 • Outline



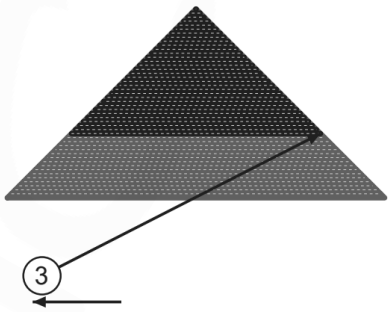
Close the empty outline.

A02 • First strands



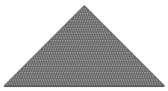
Fill from the bottom edge.

A03 • More strands



Cover the whole inside.

K02 • Cool and check
Wait until the piece is completely cool.
Check that it is flat, fully covered and matches the pattern. Repair a gap as in A08.



A06 • Check

Obrys, kolejne pasma i pełna figura. Szare pasma już są; ciemne dochodzą w danym kroku. Wybierz własne kolory PLA.

PARTS FOR THIS STAGE

1 × Large triangle L1 · PLA | template T01

Outline and full coverage as in K01; let it cool and check it as in K02.

Choose PLA colours for your pieces. Start with L1: close the outline on the sheet over the pattern. From the bottom edge, run adjacent strands from outline to outline. Change direction each time and let each strand overlap the previous one slightly. Fill the whole inside.

Check

K02 - Cool and check. Wait until it has cooled completely. Check for full coverage and a match with the pattern; place the cold figure beside the pattern and check that it is flat.

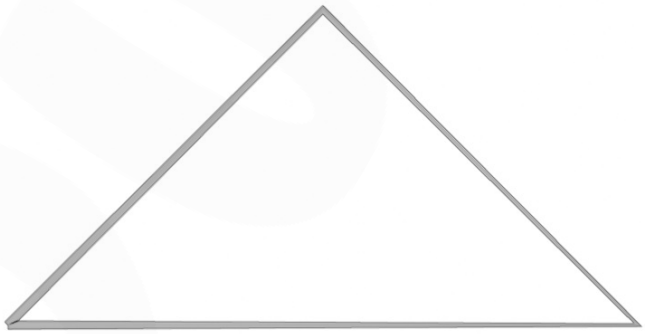
If it does not work

Repair a gap as in A08.

Build a fully filled piece — construction details

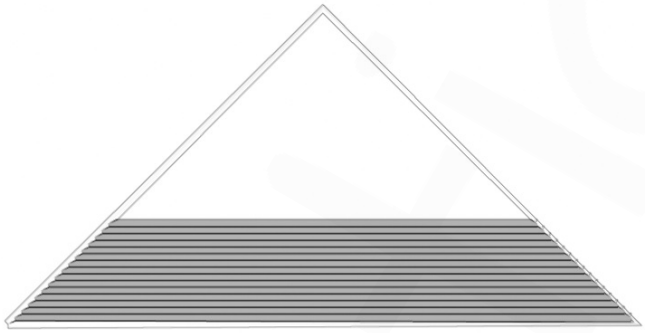
Stage outcome

Outline — inside empty



Build a fully filled piece — construction details

Partial coverage



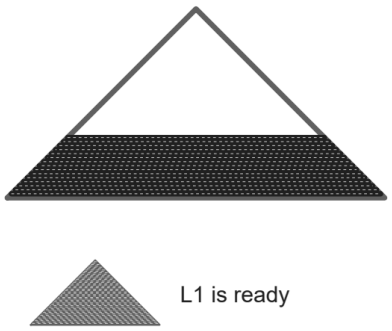
Whole inside covered

STAGE 02 / 04 • Session wykonanie i zabawa — szacunek bez limitu lekcyjnego

Seven figures

K03 • Repeat the cycle for the next six pieces

A07 • L2 in progress



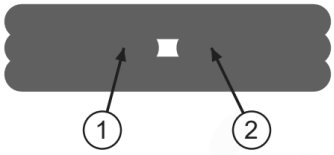
L1 is ready

Finish, cool and check L2.

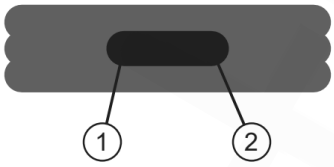
A08 • Only if there is a gap

Close-up of one L2 strand

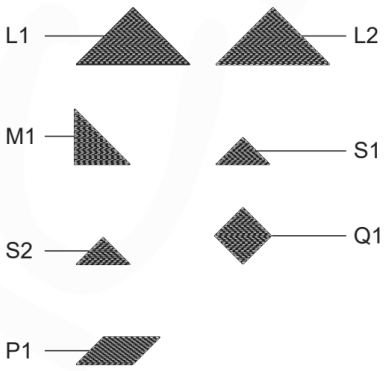
Before: a gap in one strand



After: a short strand joins the ends



A09 • Complete set: 7



L1 L2 M1 S1 S2 Q1 P1

On the sheet over the pattern, bridge the gap with a short PLA strand overlapping both ends (1–2). Let it cool and check it.
Repair a gap only if one appears. Replace a piece that stays bent.

Wypełnij następne figury i skompletuj siedem części. A08 pokazuje naprawę przerwy.

PARTS FOR THIS STAGE

1 × Large triangle L2; 1 × Medium triangle M1; 1 × Small triangle S1; 1 × Small triangle S2; 1 × Square Q1; 1 × Parallelogram P1 · PLA | template T01

Outline and full coverage as in K01; let it cool and check it as in K02.

L1 is ready. Make L2, M1, S1, S2, Q1 and P1 in order, each on its own T01 outline. Repeat the K01 technique: a closed outline, adjacent strips starting at the edge, and full infill. After each figure, perform the K02 check and place the cold part beside the pattern. Make two large triangles and two small triangles in total.

✓ **Check**

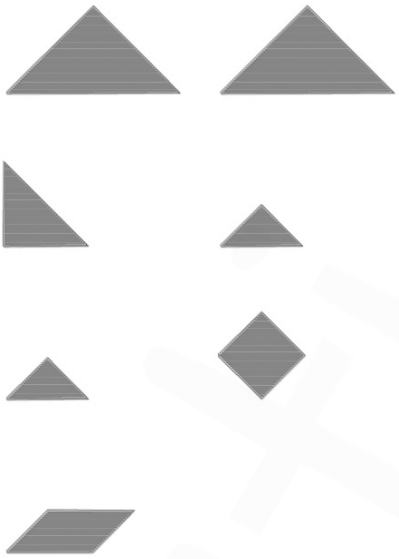
You have 7 separate, cool pieces: 2 large triangles, 1 medium triangle, 2 small triangles, a square and a parallelogram. Each is flat, fully filled and matches its pattern.

If it does not work

Repair a gap as in A08; replace a piece that stays bent.

Seven figures — construction details

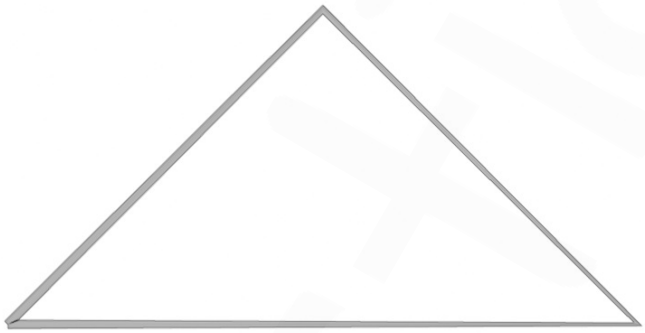
Stage outcome



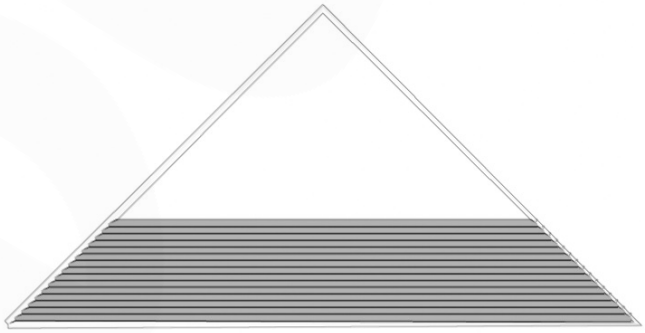
Two finished parts beside the pattern; after checking the remaining parts, place each one separately in the same way.

Seven figures — construction details

L2: outline - interior empty • What to repeat: Outline M1; Outline S1; Outline S2; Outline Q1; Outline P1

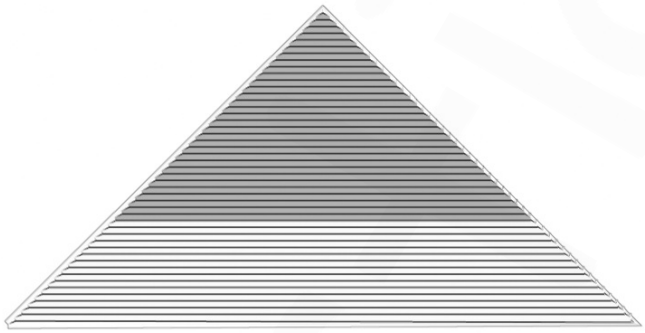


L2: first strips • What to repeat: M1 strips; S1 strips; S2 strips; Q1 strips; P1 strips



Seven figures — construction details

L2: complete figure • What to repeat: Complete M1; Complete S1; Complete S2; Complete Q1; Complete P1

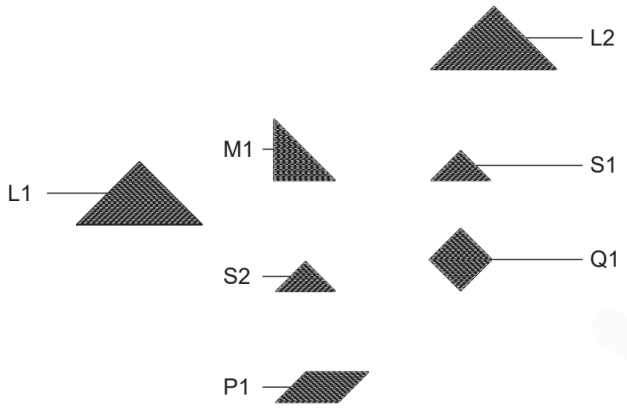


STAGE 03 / 04 • Session wykonanie i zabawa — szacunek bez limitu lekcyjnego

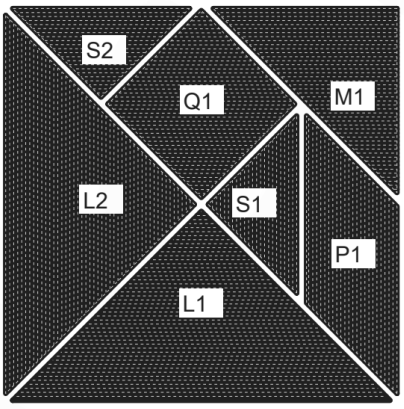
Arrange the square

K04 • A square made from the same seven pieces

A10 • Start with L1



A11 • Complete square



Compare your arrangement with T02: a 9 × 9 cm square.
Move and rotate the pieces without forcing them. Small gaps are expected.
All seven pieces lie flat. None overlaps another.

Te same siedem części tworzy kwadrat 9 × 9 cm.

Arrange the seven cool pieces by following the T02 solution to make a 9×9 cm square. Move and rotate them without forcing them; the pieces must not overlap. Small gaps are expected.

✓ **Check**

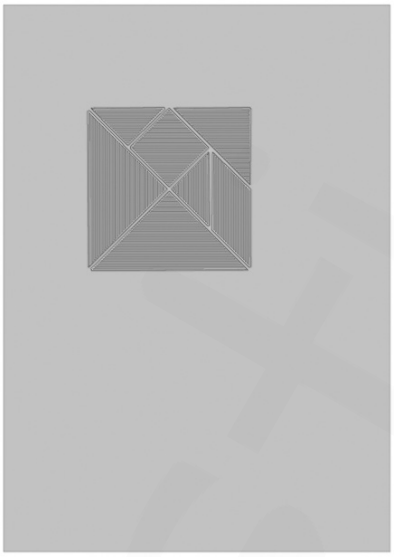
All 7 pieces are in the square. Each lies flat, and none overlaps another.

If it does not work

Compare the arrangement with T02. Check any piece that still does not fit against its own pattern. Do not force it.

Arrange the square — construction details

Square solution



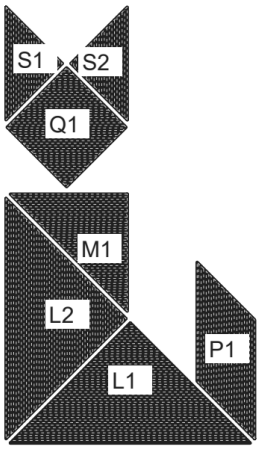
L1 placed; the others are beside it

STAGE 04 / 04 • Session wykonanie i zabawa — szacunek bez limitu lekcyjnego

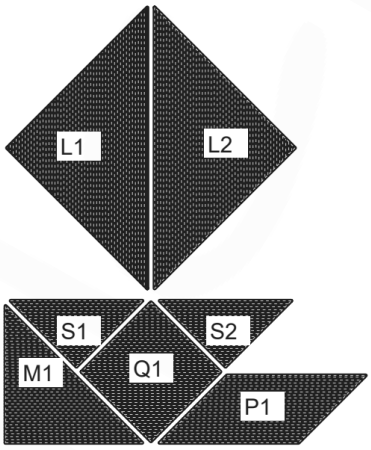
Cat, sailboat and your own picture

K05 • Take the square apart and make more pictures

A12 • Cat



A13 • Sailboat



In each picture, use L1, L2, M1, S1, S2, Q1 and P1 exactly once, with no overlaps.
Move and rotate the cool pieces; you may flip the parallelogram over.
Then invent your own picture. A different picture size does not change the scale of the pieces or the T03 patterns.

Kot i żaglówka z siedmiu części. Spróbuj też własnej sylwetki.

Choose the cat or sailboat from T03. Cover the solution and arrange the picture using all 7 pieces without overlaps. Then reveal the solution and compare. Try the other pattern, then invent your own picture. You may flip P1 over.

✓ **Check**

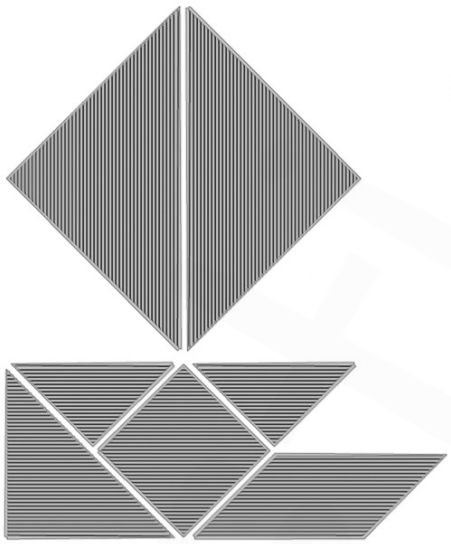
Use all 7 pieces in every picture, each piece only once. Your own picture may look different from the examples.

If it does not work

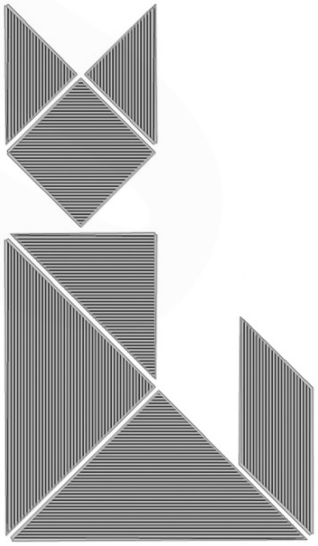
Reveal the solution and compare one piece at a time by its ID and edges. Move or rotate a piece that does not match.

Cat, sailboat and your own picture — construction details

Sailboat: all 7 pieces



Cat: all 7 pieces



Finished — check the outcome

Check
Exactly 7 separate, flat and cool pieces: L1, L2, M1, S1, S2, Q1 and P1.

Check
No holes in the fill and no separating strands; an outline alone is not a finished piece.

Check
All 7 pieces fit in the 90 × 90 mm square pattern without overlapping or being forced. The working clearance comes from the actual line width.

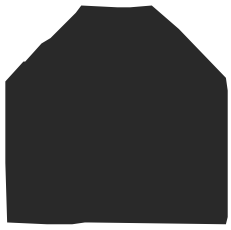
Check
The cat and sailboat each use the same 7 pieces once; they can be taken apart again.

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.

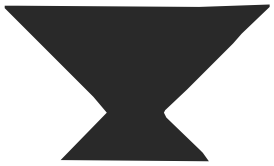
20 silhouette puzzles

Make each black silhouette with all seven pieces. Rotate and move them; you may flip the parallelogram.
These are small puzzle targets, not full-size tracing templates.

01



02



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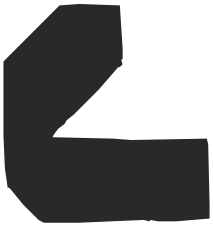

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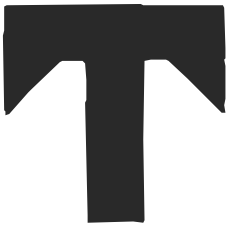

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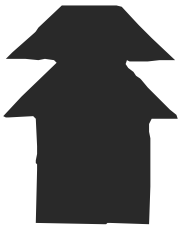

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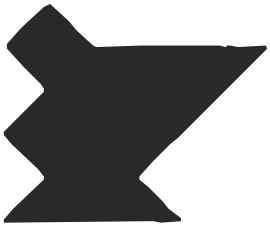

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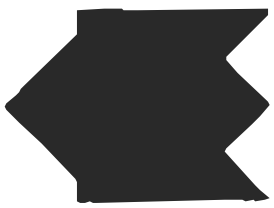

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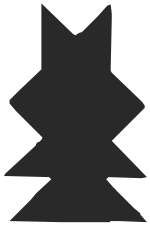
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