

Becoming Creative

RStudio::conf 2022

Alice Walsh



@sciencealice



I am not
creative



Eight Ways to Identify Creative People ...
radcomservices.com



Become A More Creative Pe...
newswatchtv.com



How to Be The Most Creative Person in ...
wedu.com



10 Signs of a Creative Mind
verywellmind.com



More Creative Person
selecthealth.org



creative, successful person ...
wtop.com



highly creative people ...
thesecoundprinciple.com



How to Be a Creative Person – Turner ...
turnerstories.com



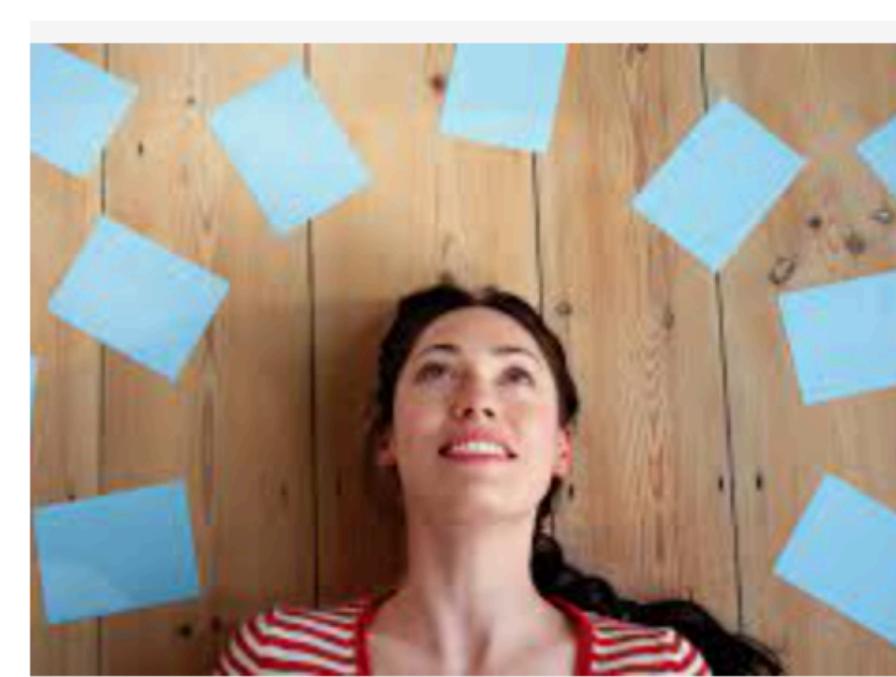
How to Focus the Hyper Creative Mind ...
lifehack.org



Signs That a Person Is Creative - 15 ...
15-ideas.com



Display a menu





Best seller Rollback

The Pioneer Woman

**The Pioneer Woman Floral Patch Quilt,
Full/Queen, Multi**

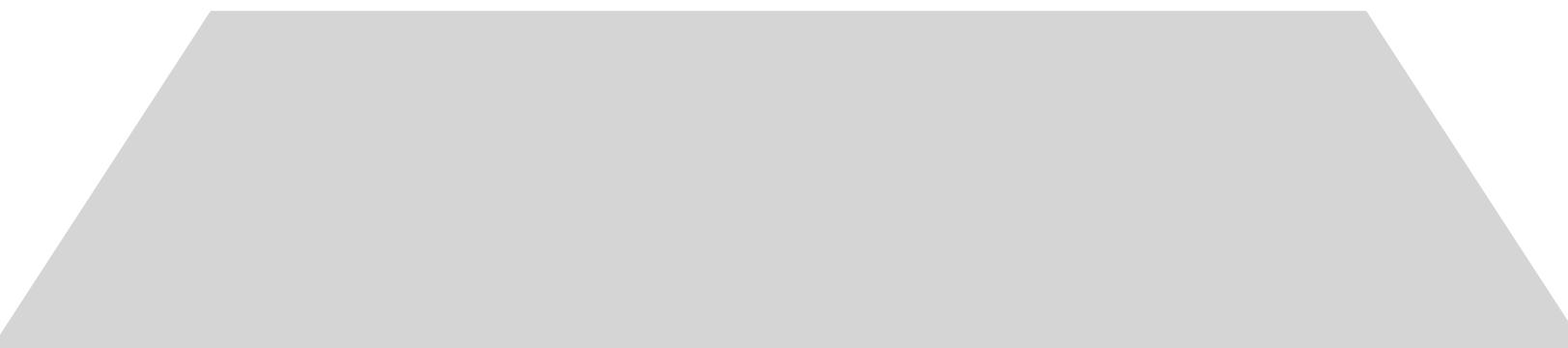
★★★★☆ (4.2) 39 reviews

\$44.67 \$55.00 ⓘ \$44.67/ea

Add to cart



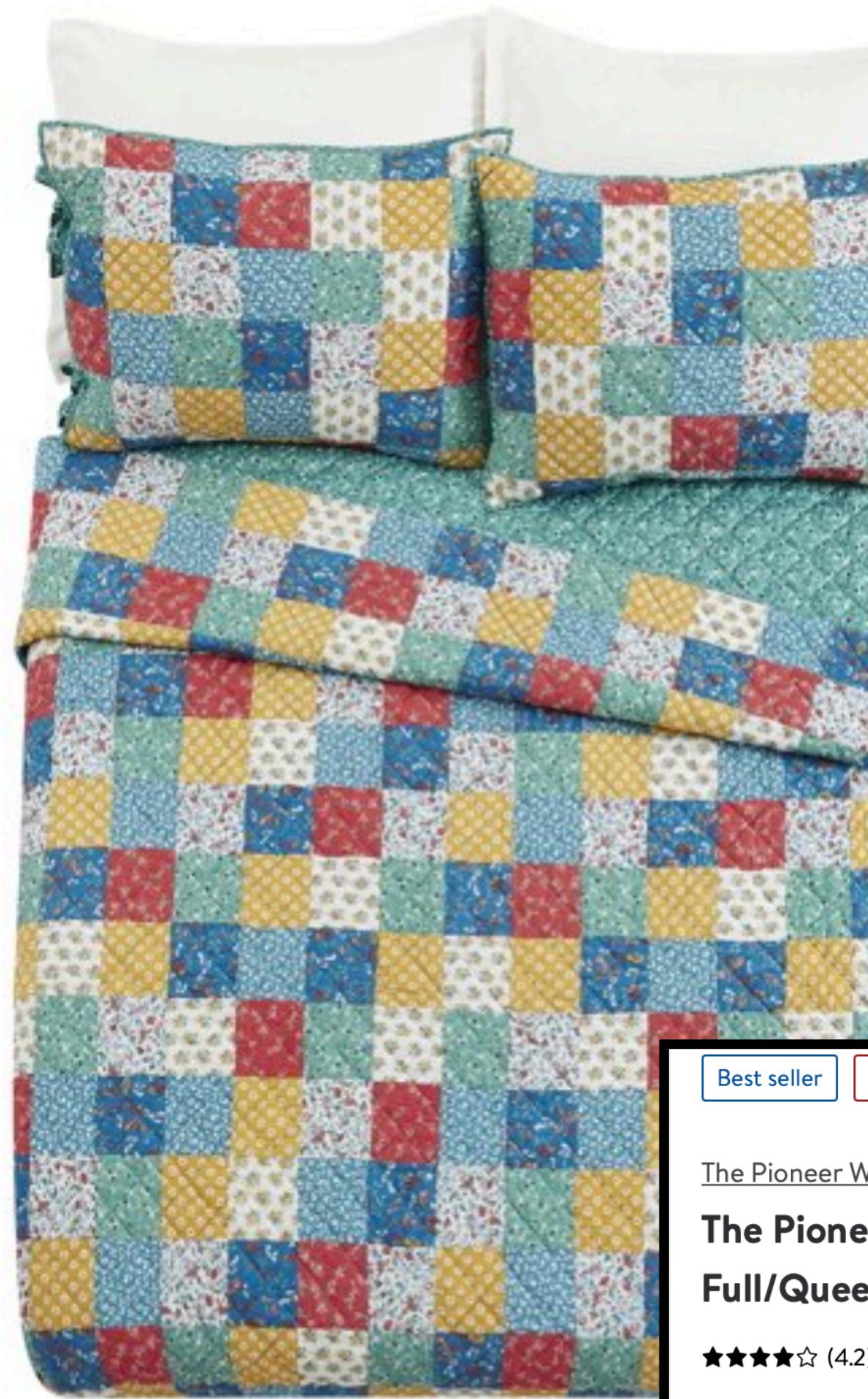
Top



Batting



Back



Best seller

Rollback

The Pioneer Woman

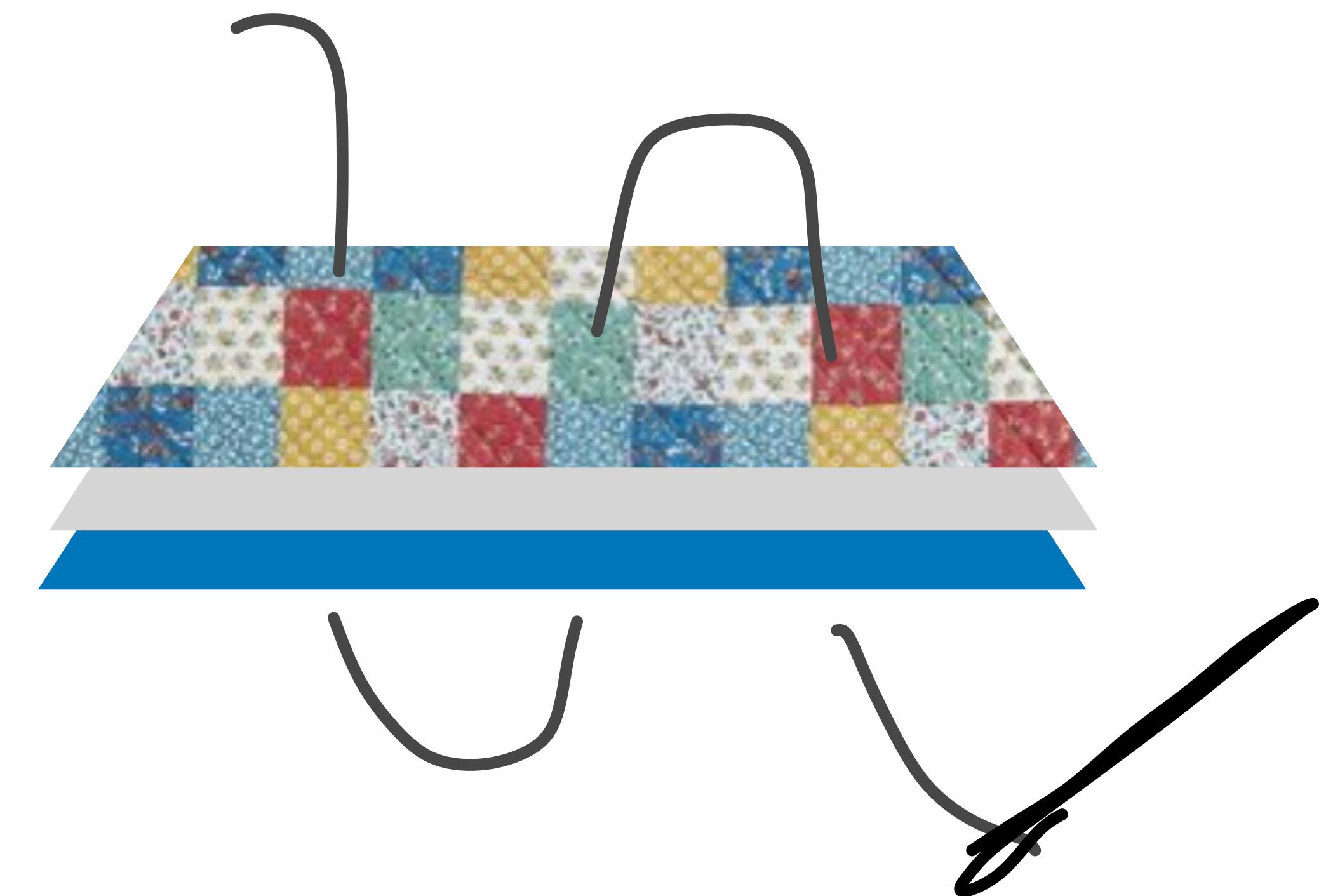
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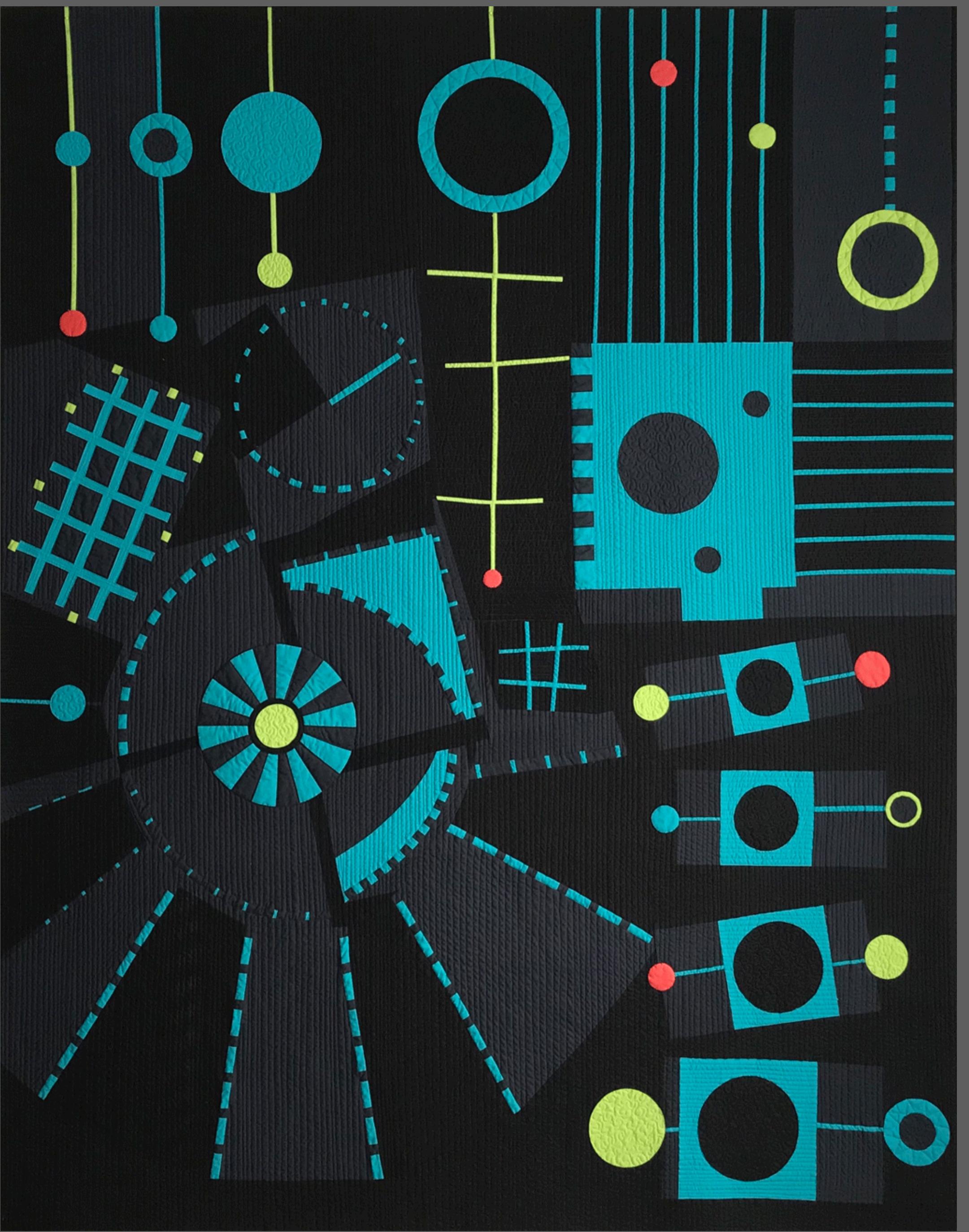
Quilting



```
fabric %>%
  cut() %>%
  sew() %>%
  sandwich(battting, back) %>%
  quilt()
```



Blooming by Emilie Trahan



Broken Clock
by Annie Hudnut



Watercolor Study No. 6
by Audrey Esarey



still not
by Chawne Kimber



Pride and Joy
by Veruschka Zarate

The prerequisite for
doing **exciting** work
is to be **excited** about it
yourself

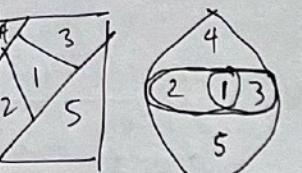
Kurt Andersen (writer, host of Studio 360)

Step 1

Come up with too many ideas

quitting again

HYPERGRAPHS
represented as hypergraph - data structure?



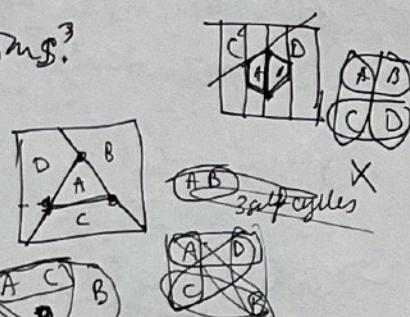
pluck any 1 edge
- check for cycles
→ if yes → ERROR
- if acyclic
- then remove low order nodes until all gone
- reverse order and form that is the quitter!

any (me shaded)
edge

label all the areas (holes)
label fine edges (hyperedges)

x y color
→ find area based on corners?
→ smallest area w/o any other lines?
→ need segments and not just points?
→ can find touching based on the point maximum + intersections.
→ use labels for the sections?
→ aspect ratios straight?

① use area labeled
② each line to edge
③ create number grid
④ test for cycles



value

id	x ₁	y ₁	x ₂	y ₂	x ₃	y ₃	x ₄	y ₄	value
1	1	1	1	2	1	3	1	4	1
1	1	2	1	3	1	4	1	5	1
1	1	3	1	4	1	5	1	6	1
1	1	4	1	5	1	6	1	7	1

1 line 2 line 3 line 4 line 5 line 6 line 7 line

→ ① CROP

if $x > x_{max}, y_{max}$
 $x < x_{min}, y_{min}$
 $y > y_{max}, y_{min}$
 $y < y_{min}, y_{max}$

② reduce → only things in the area
intersect? over lap?
→ real code to crop to section of any shape
→ hold "BORDER" object for each?

intersect order lines w/ all lines

id	line id	x ₁	y ₁	x ₂	y ₂
1	1	1	1	2	1
1	2	1	2	1	3
1	3	1	3	1	4
1	4	1	4	1	5

→ crop this just between
if nothing → do your
do each line in
new section make
out a line

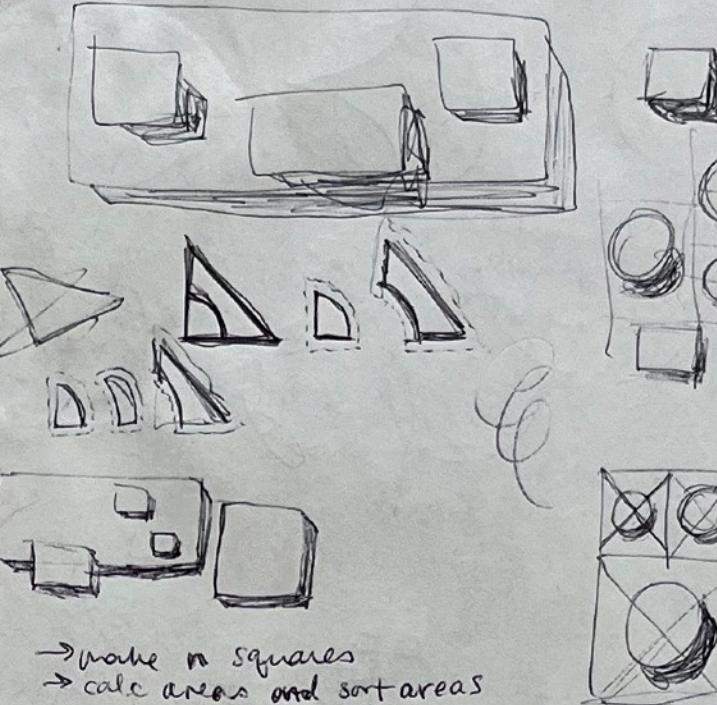
→ ③ IDEA

make n squares
calc areas and sort areas
put dark biggest first
add shadow
put down rest in order of size
add shadow

→ idea
add details w/ quitting

11
1364
9400
299
800
b 863

quilt ideas



→ make n squares
calc areas and sort areas
put dark biggest first
add shadow
put down rest in order of size
add shadow

→ idea
add details w/ quitting

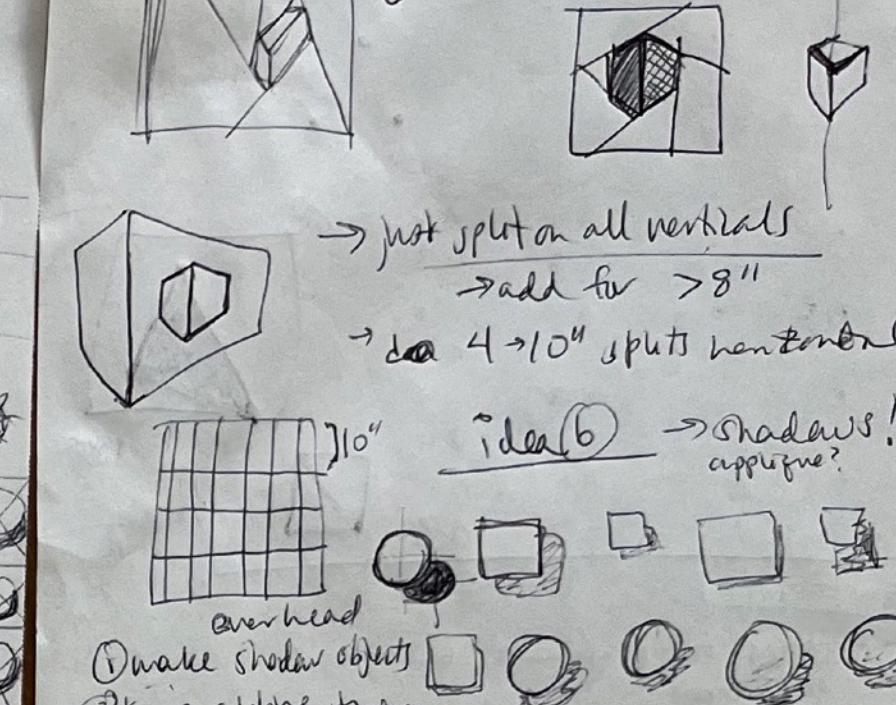
11
1364
9400
299
800
b 863

→ just split on all verticals
→ add for > 8"
→ do 4 → 10" splits horizontal

→ ④ IDEA → shadows!
over head
make shadow objects
keep adding them
⑤ IDEA

→ create pixelated designs
→ add shadows after w/ colors

→ Only split sections w/ area ≥ max area



IDEA generate a FPP random

borders are a special class of line
draws edges 1 section

① add a line → make a section to plot
a) pick 2 lines to connect
b) pick an x/y on each line
c) check if new line exists

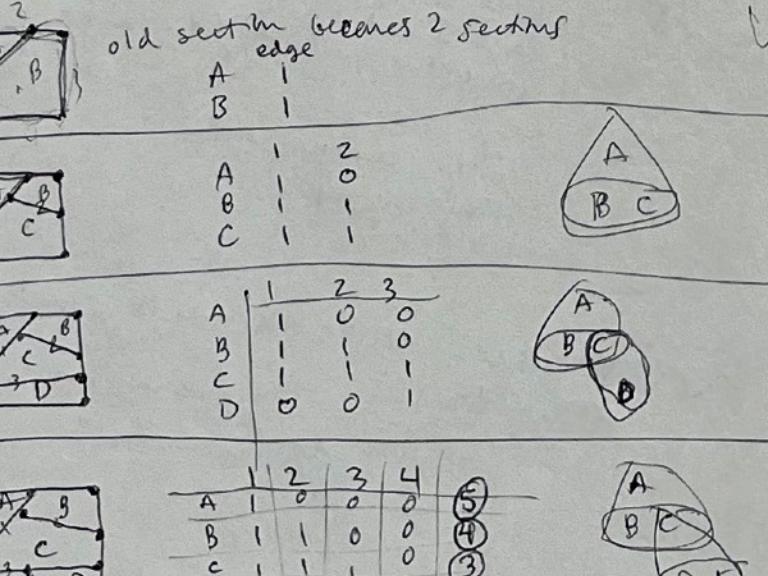
→ lines don't intersect otherwise
increase

③ create new sections
(based on side of new line)

④ test if cycles in graph
- if yes → remove line

⑤ min area?? remove if too small.

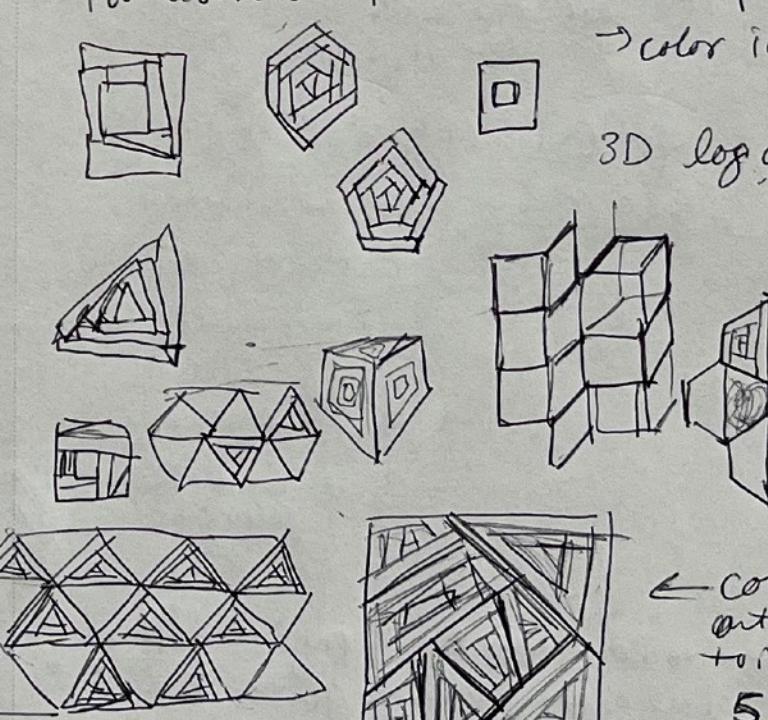
old section edge becomes 2 sections



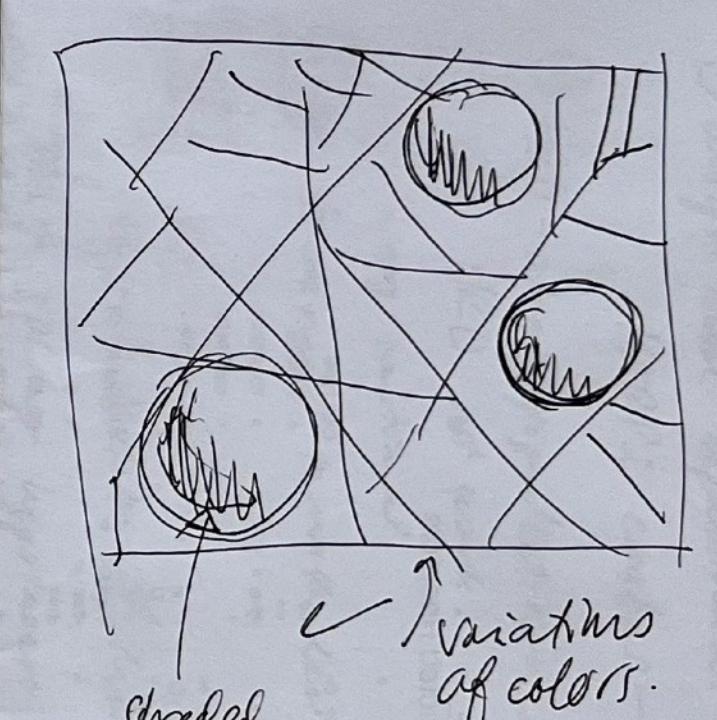
random shape - random strips
→ color ideas?
3D log cabin

color outside to make 5 colors

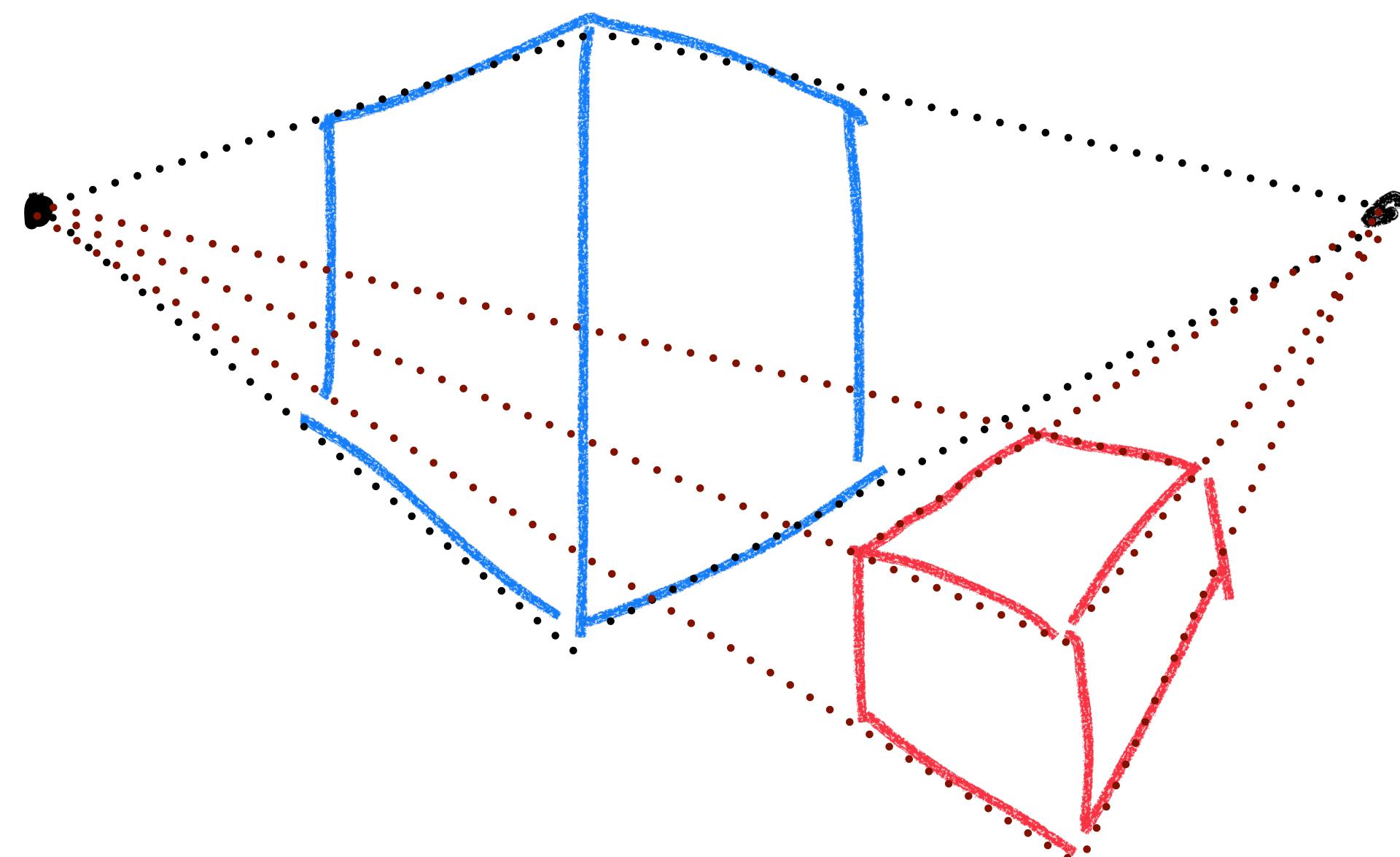
→ What if → all white strips? then do quilting with colors?
→ log cabin more like? abe lincoln?
- use variety of colors
- correct values
map average color of region overlay
1 pixels
take area color in shape



variations of colors.
shaded w/ contrast color.



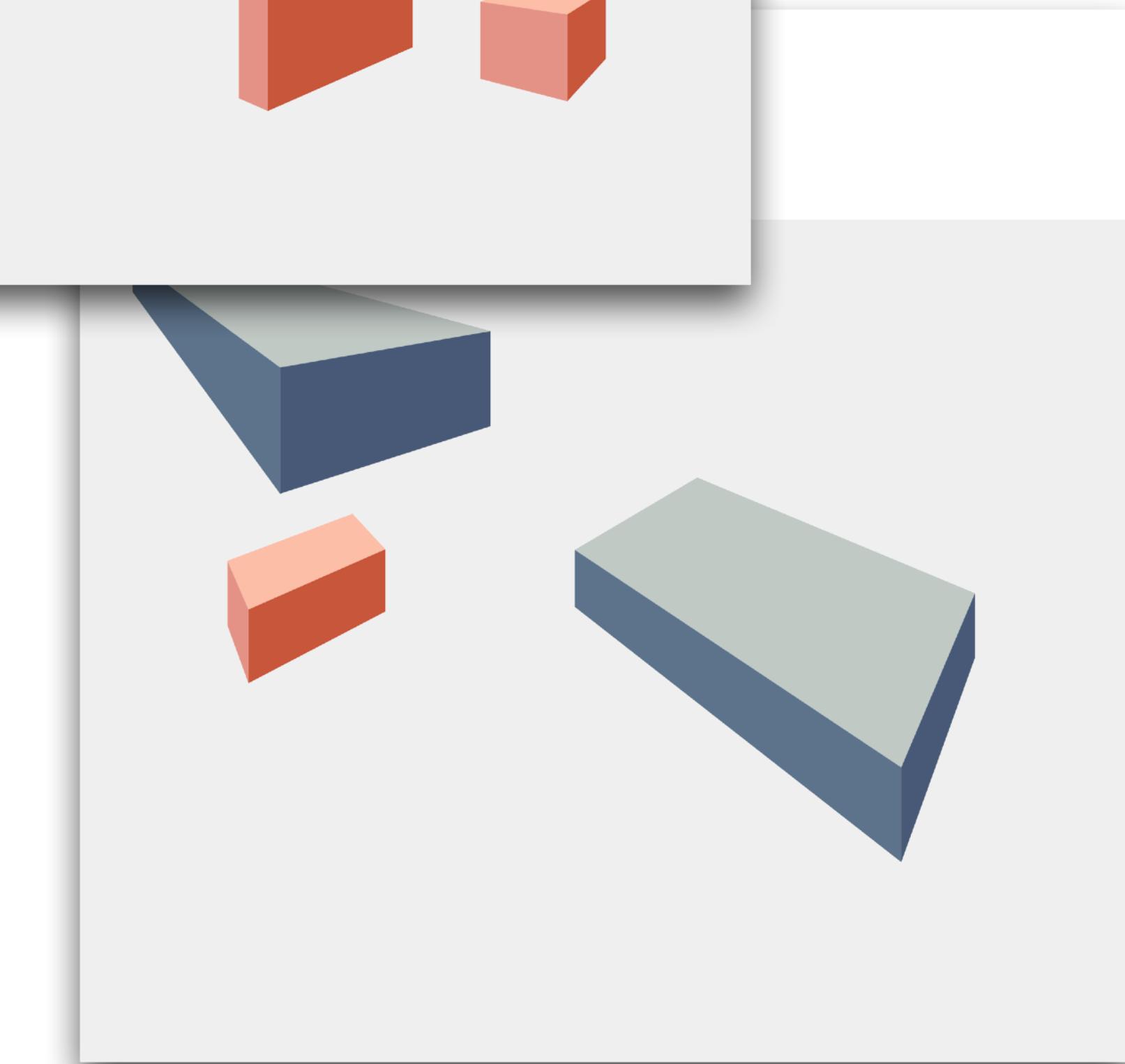
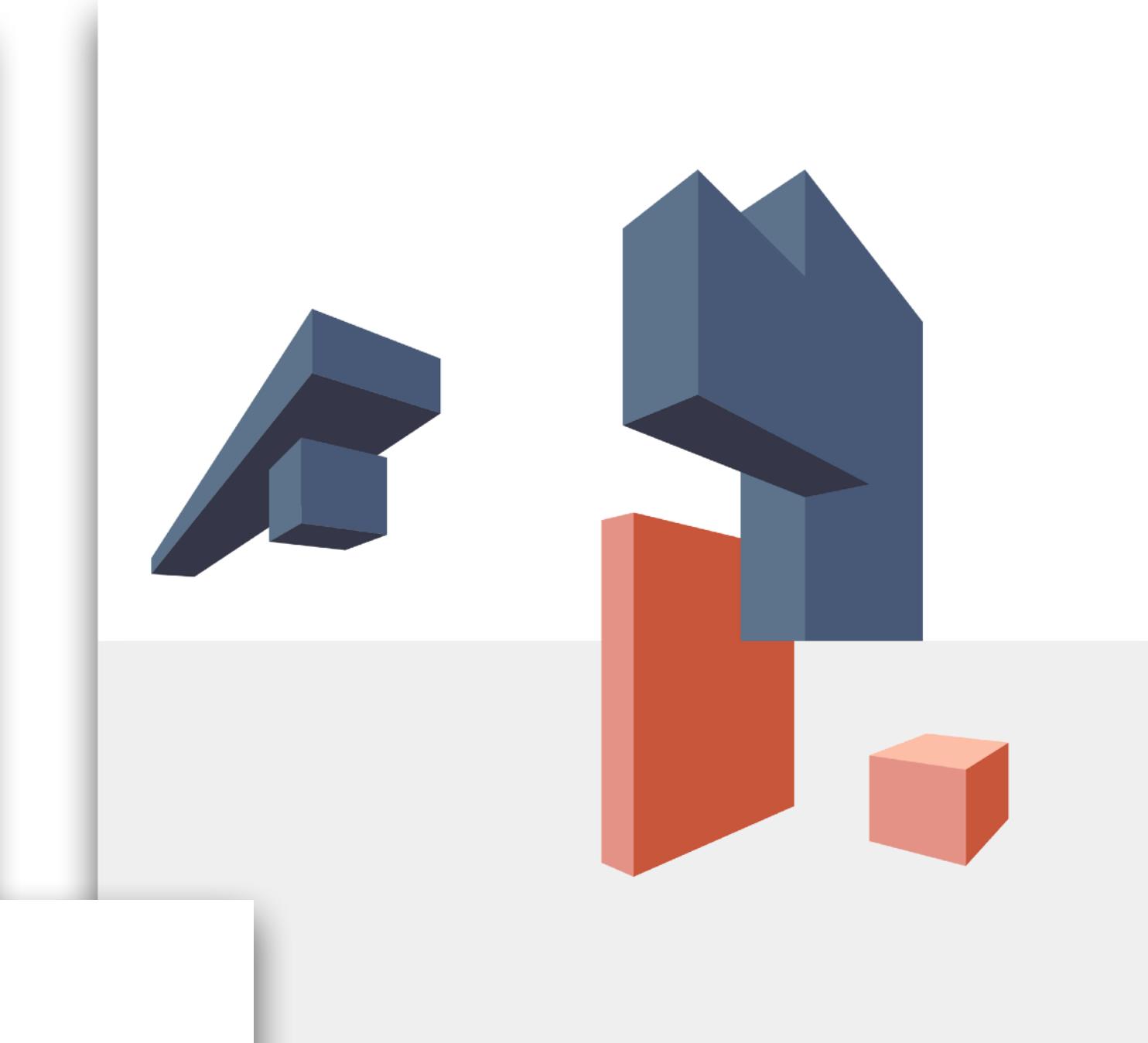
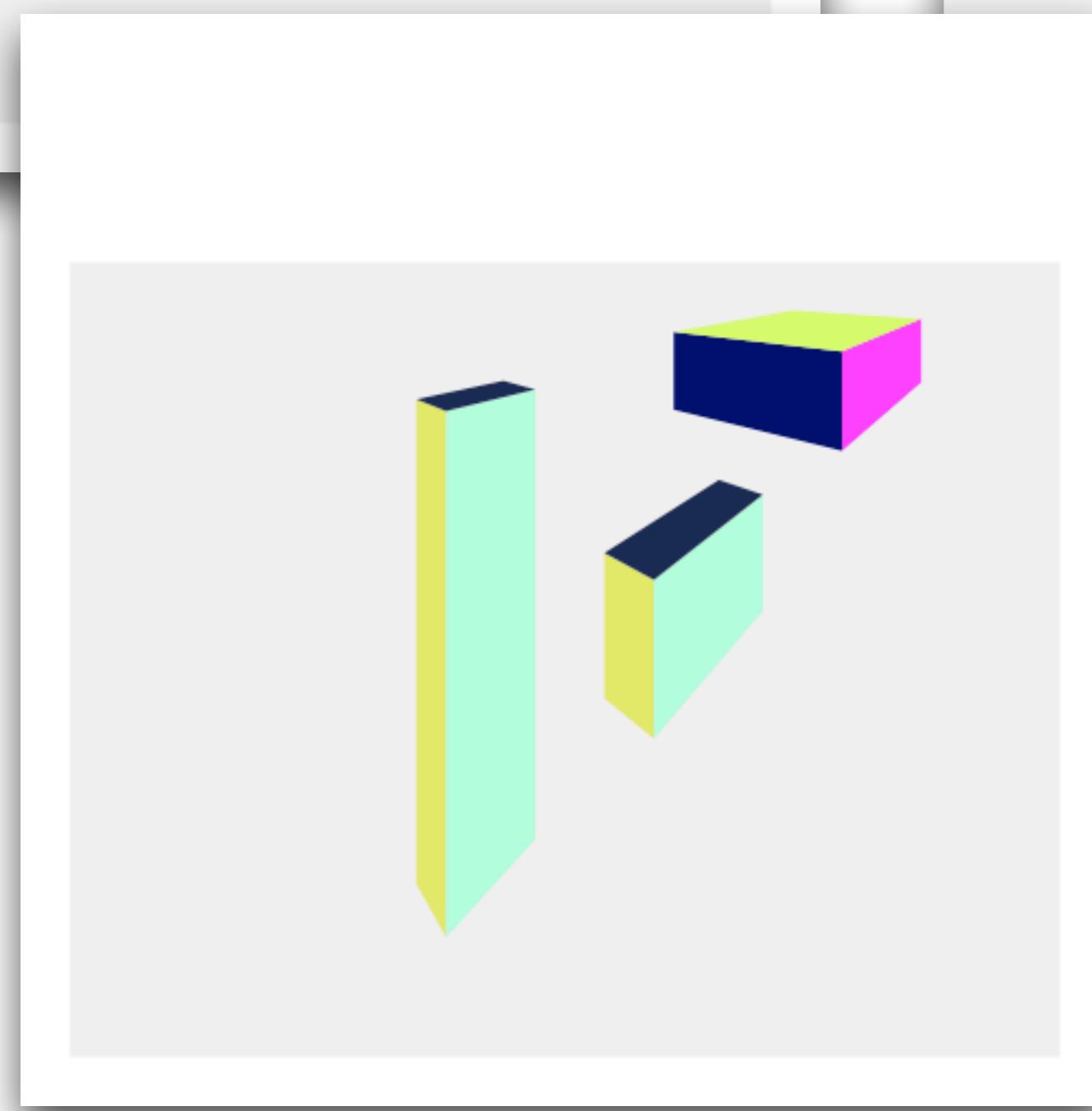
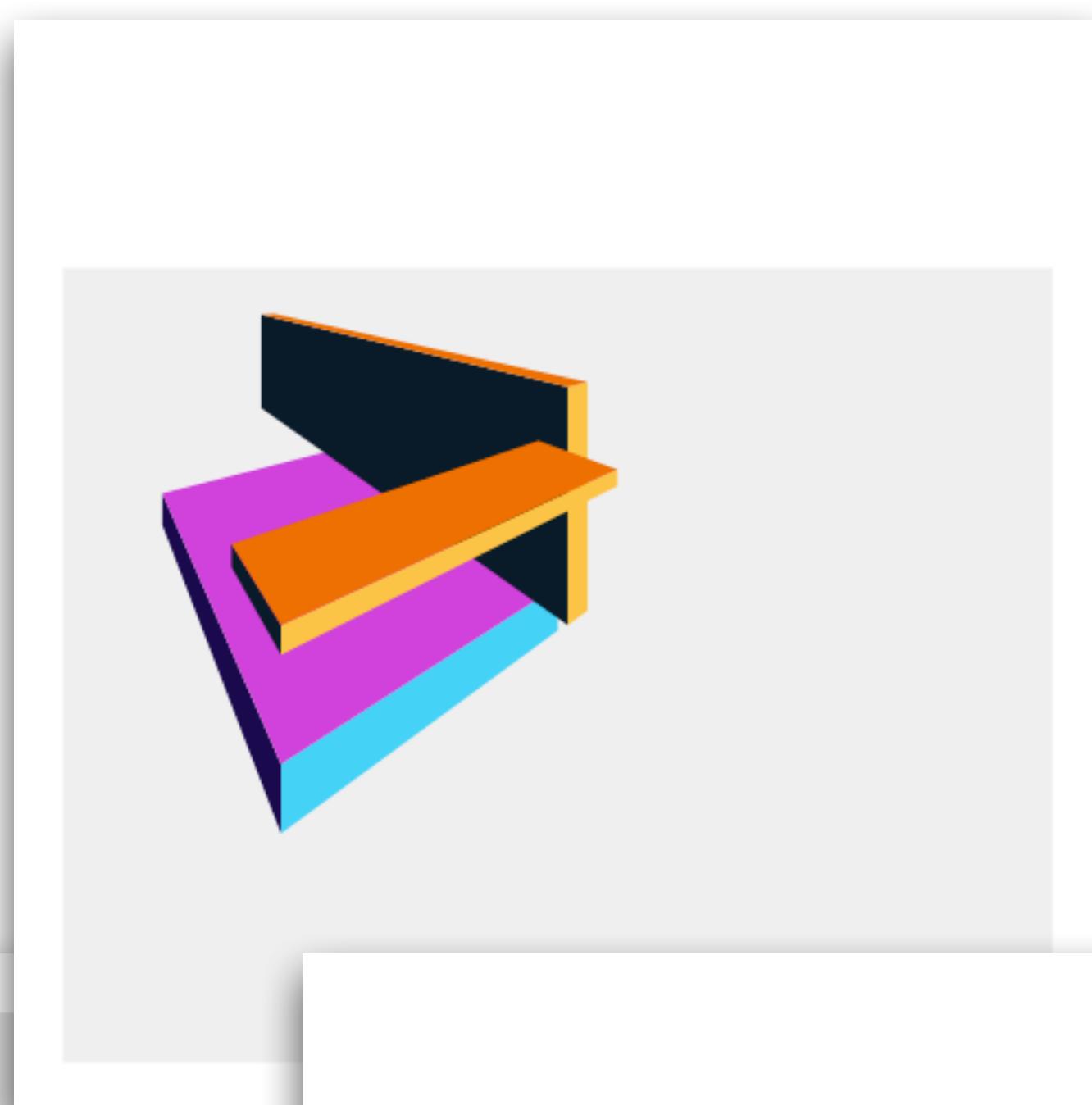
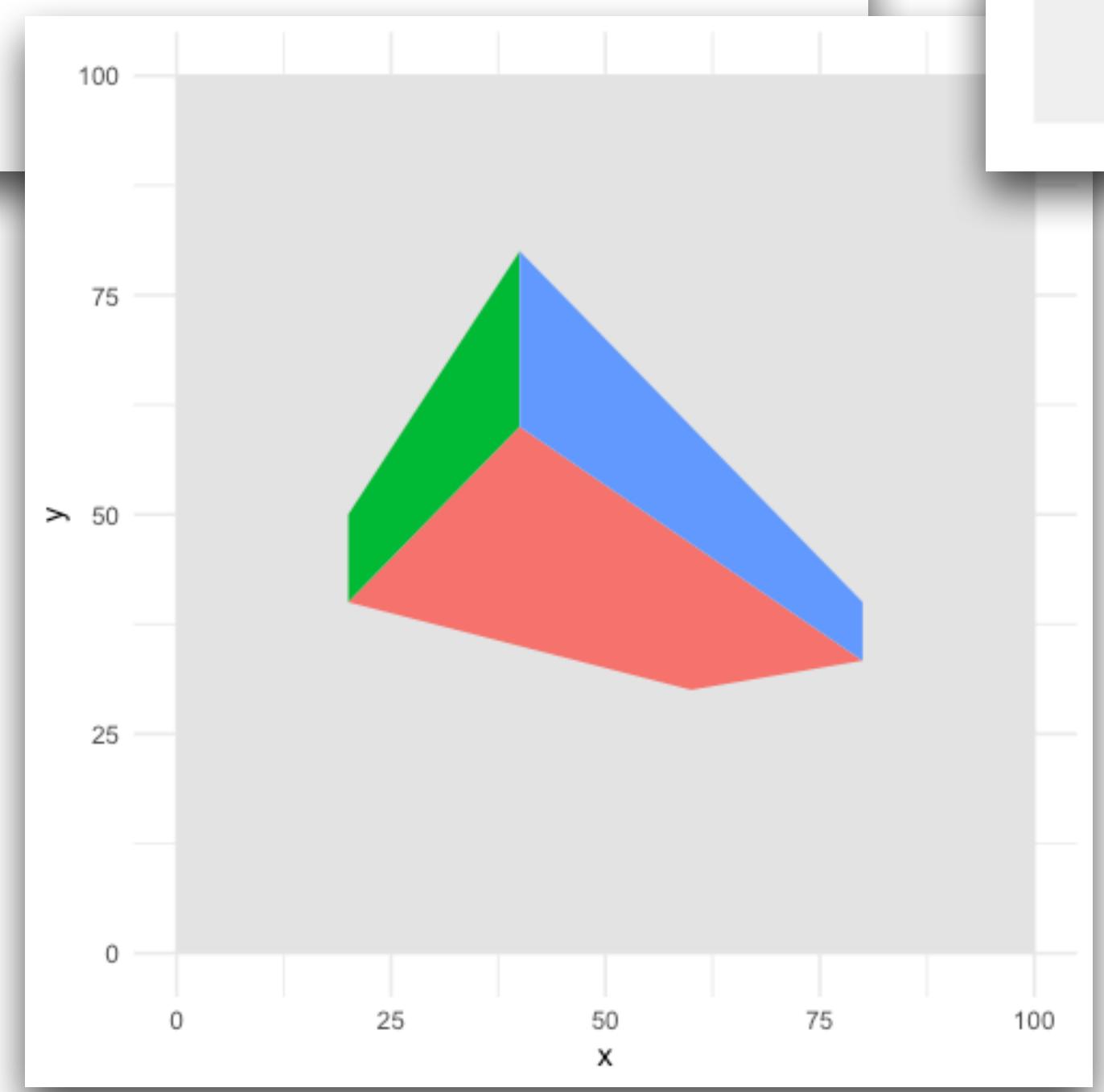
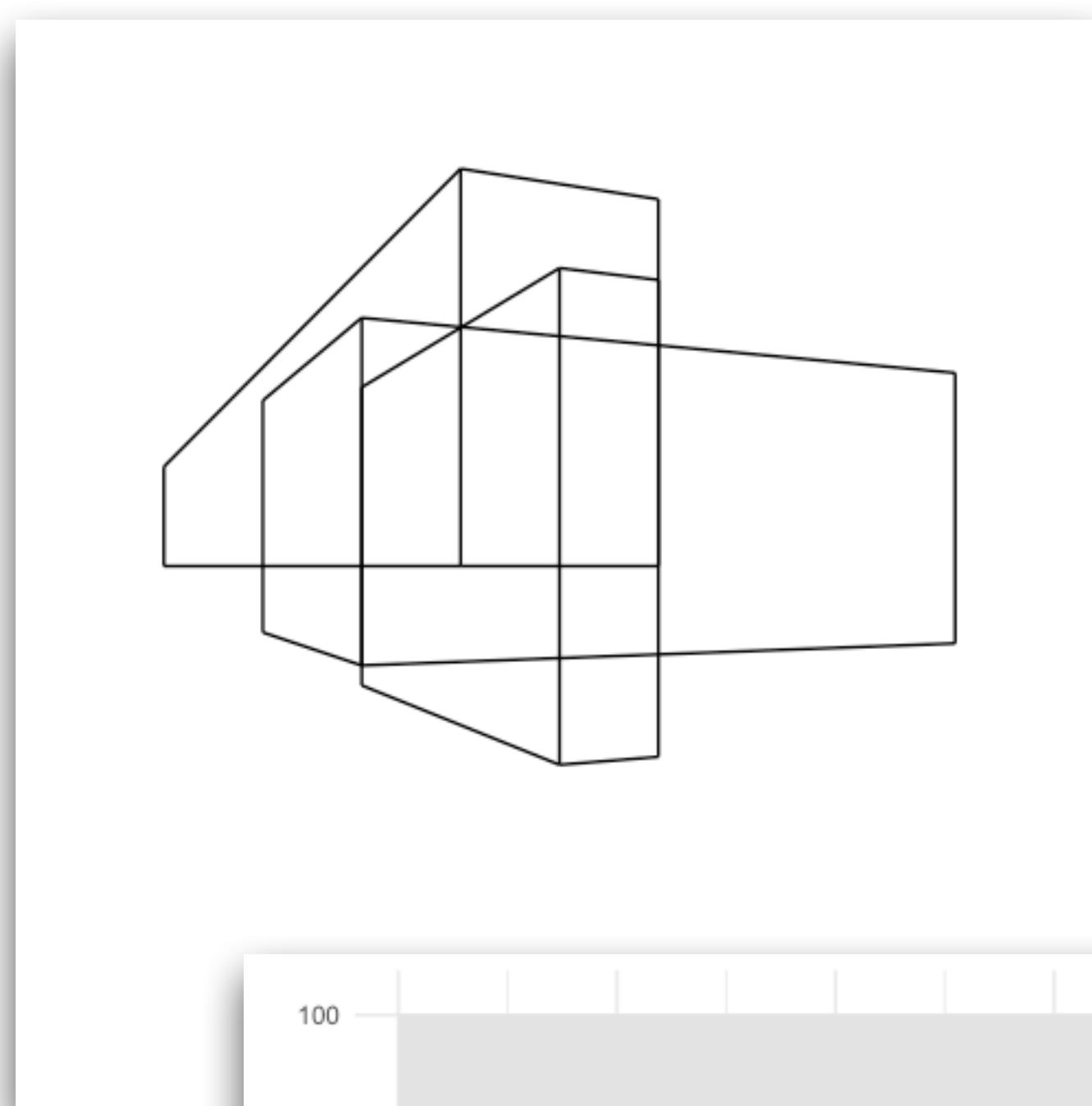
Fuse two domains



```
poly %>%
  ggplot() +
  geom_polygon(aes(x = x, y = y,
                    group = id, fill = value),
               alpha = 1) +
  theme_void() +
  theme(legend.position = "none")
```

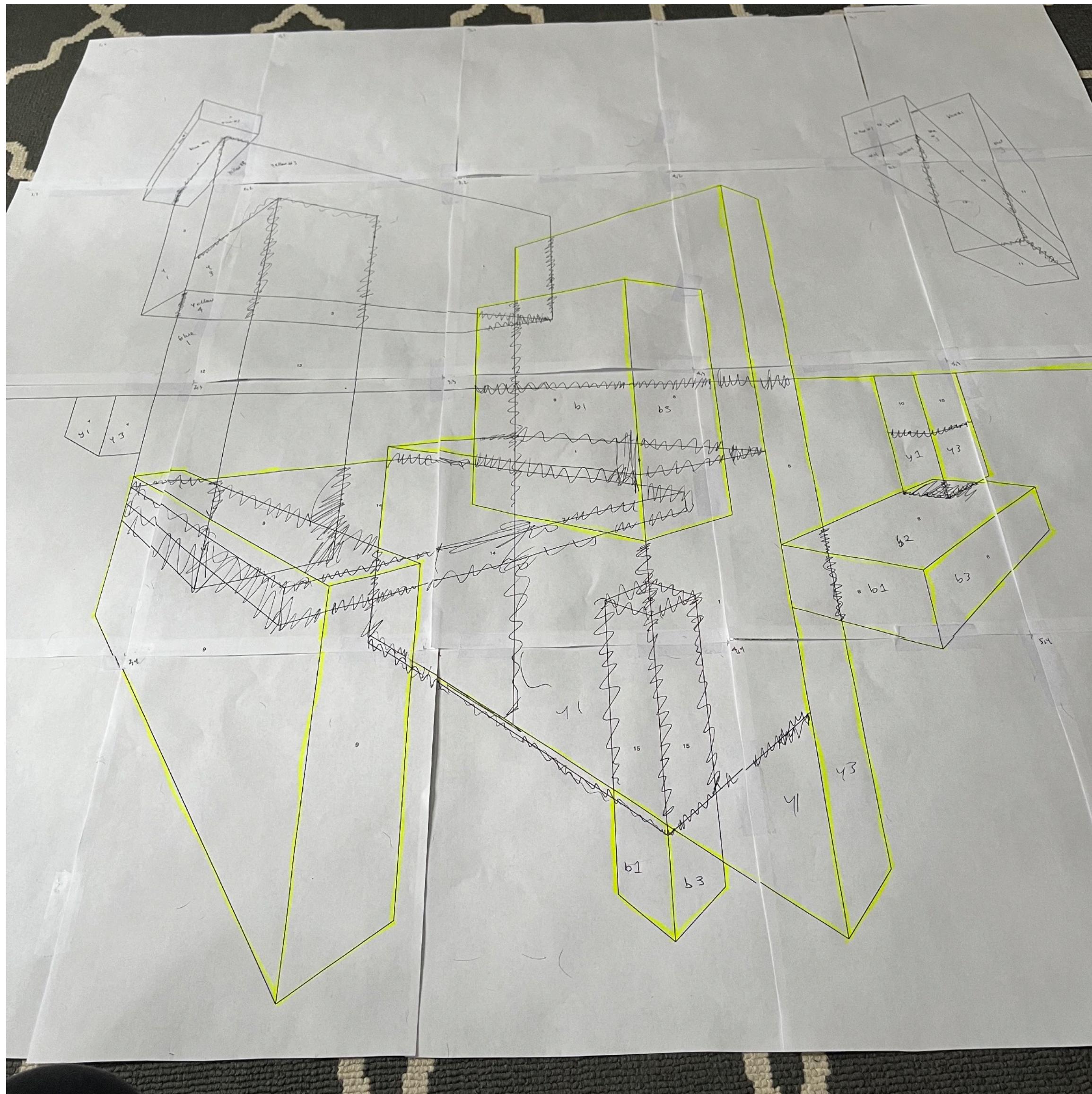
Step 2

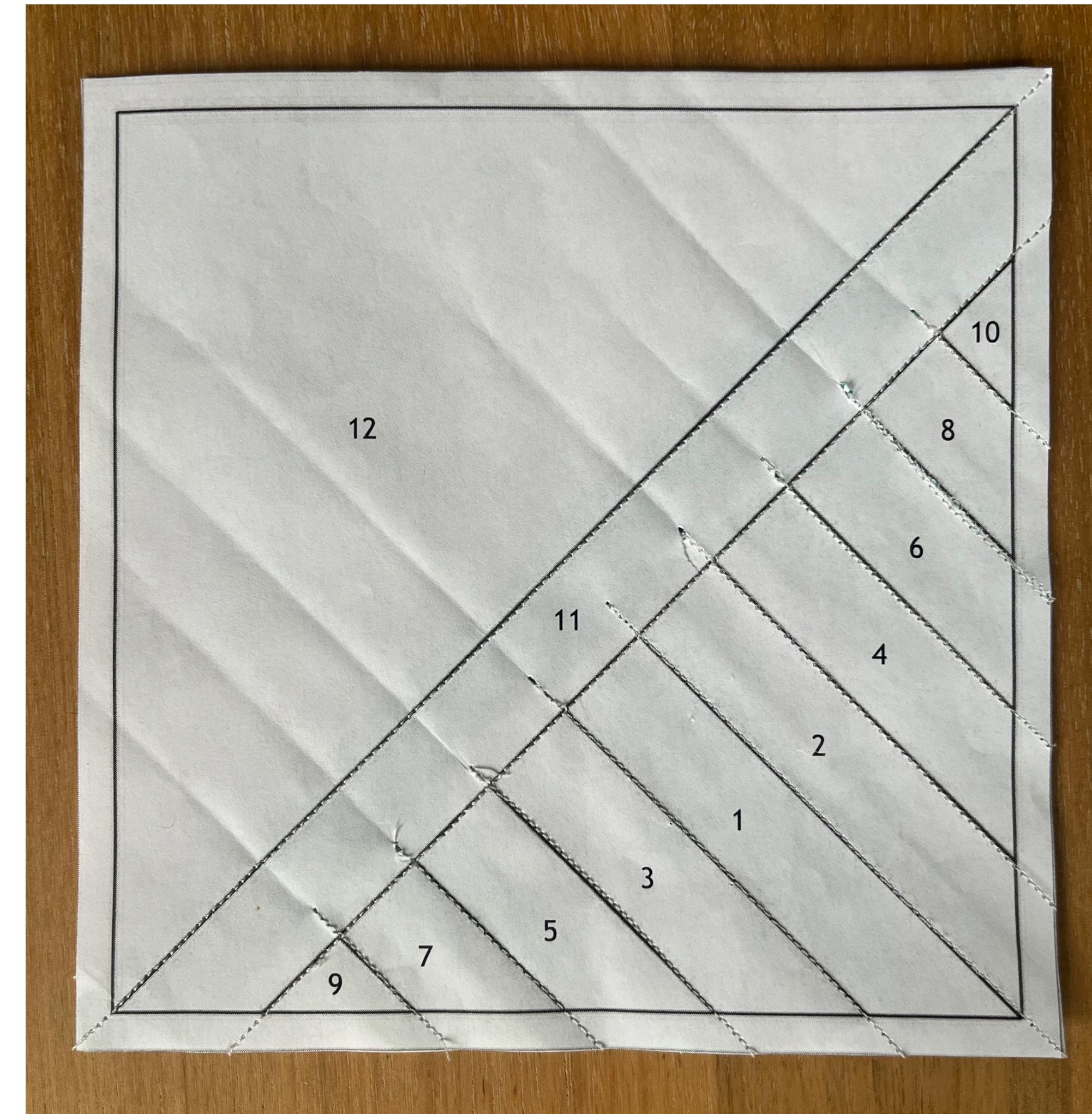
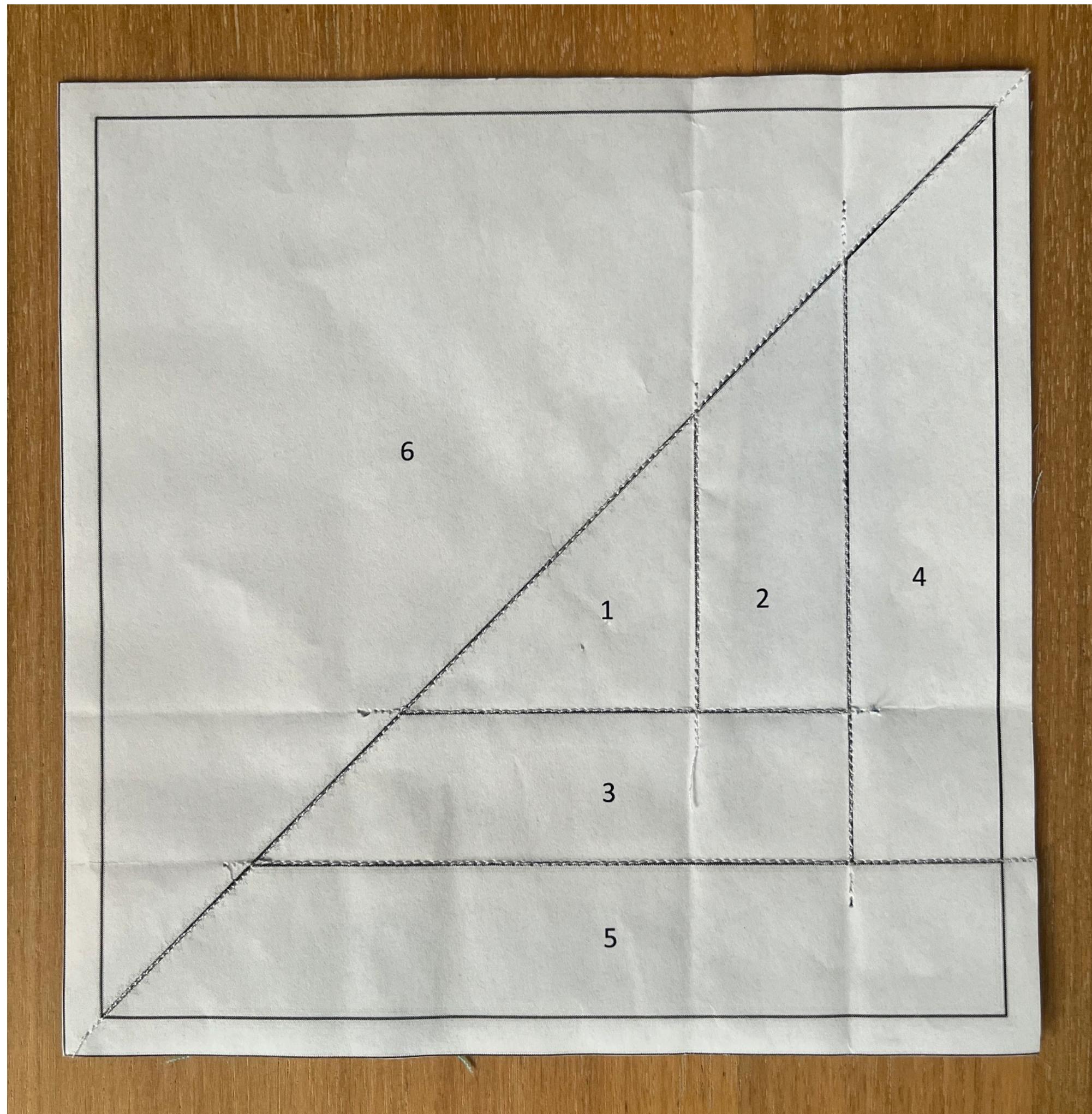
Improvise

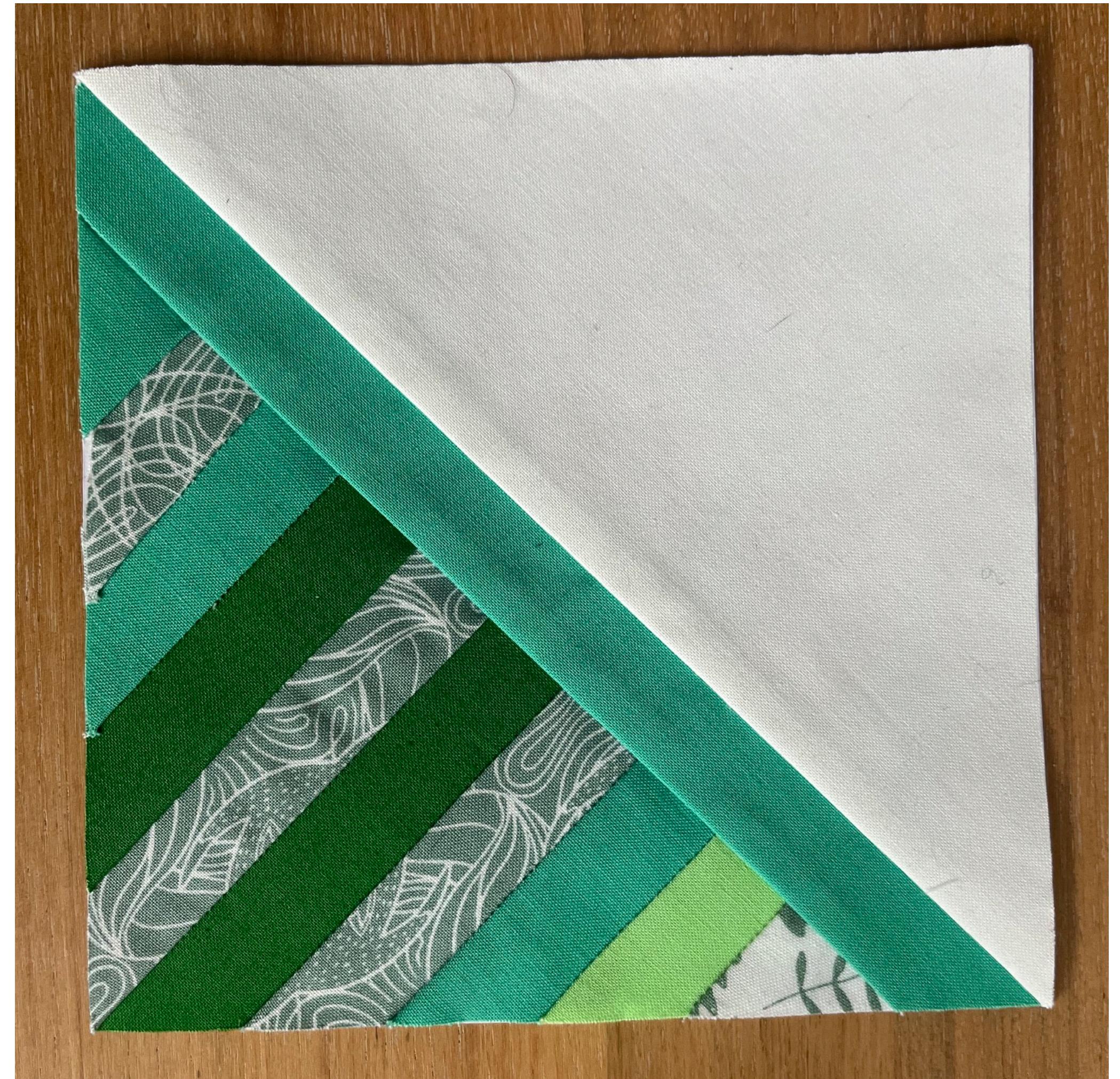


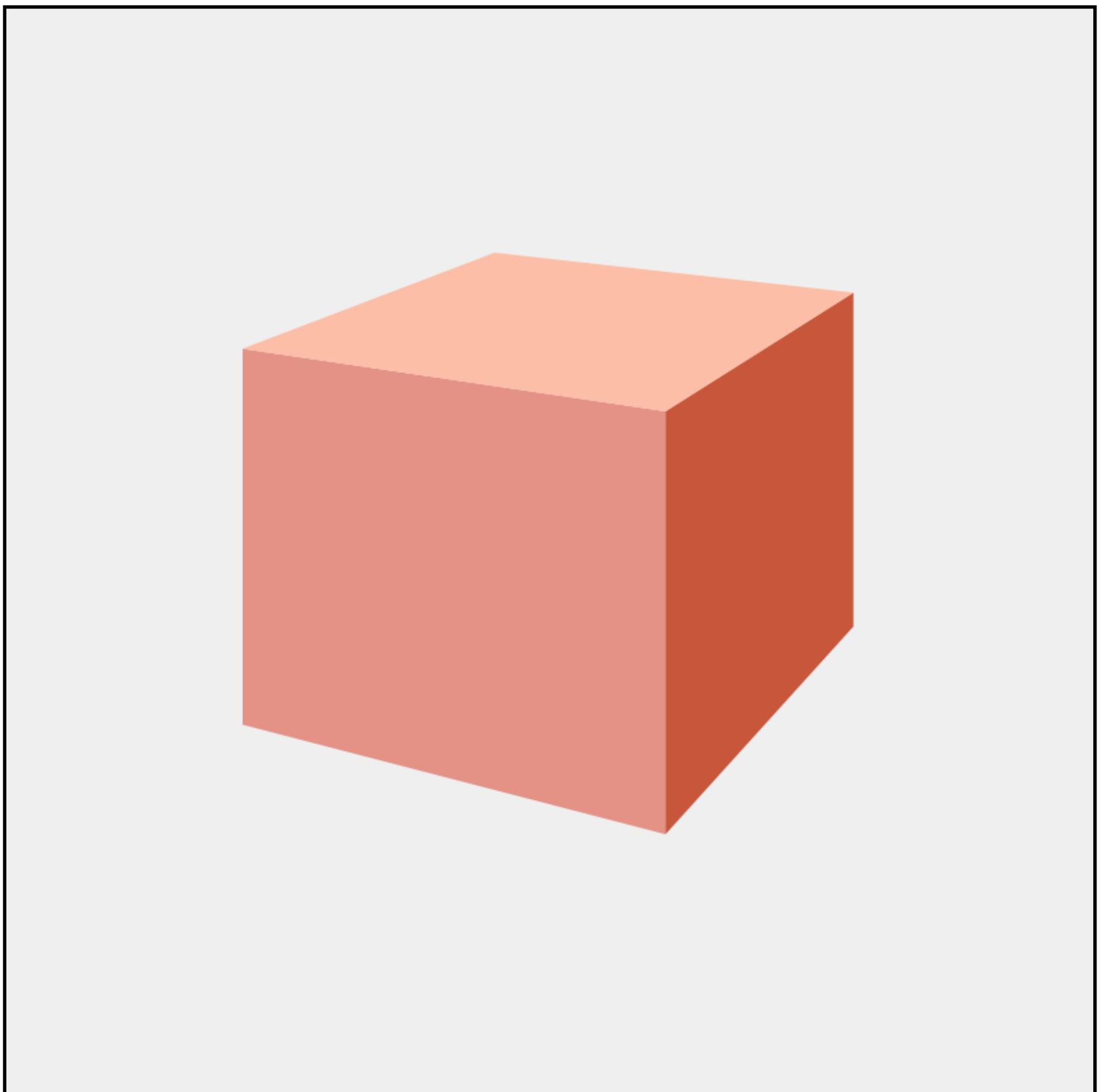
Step 3

Research

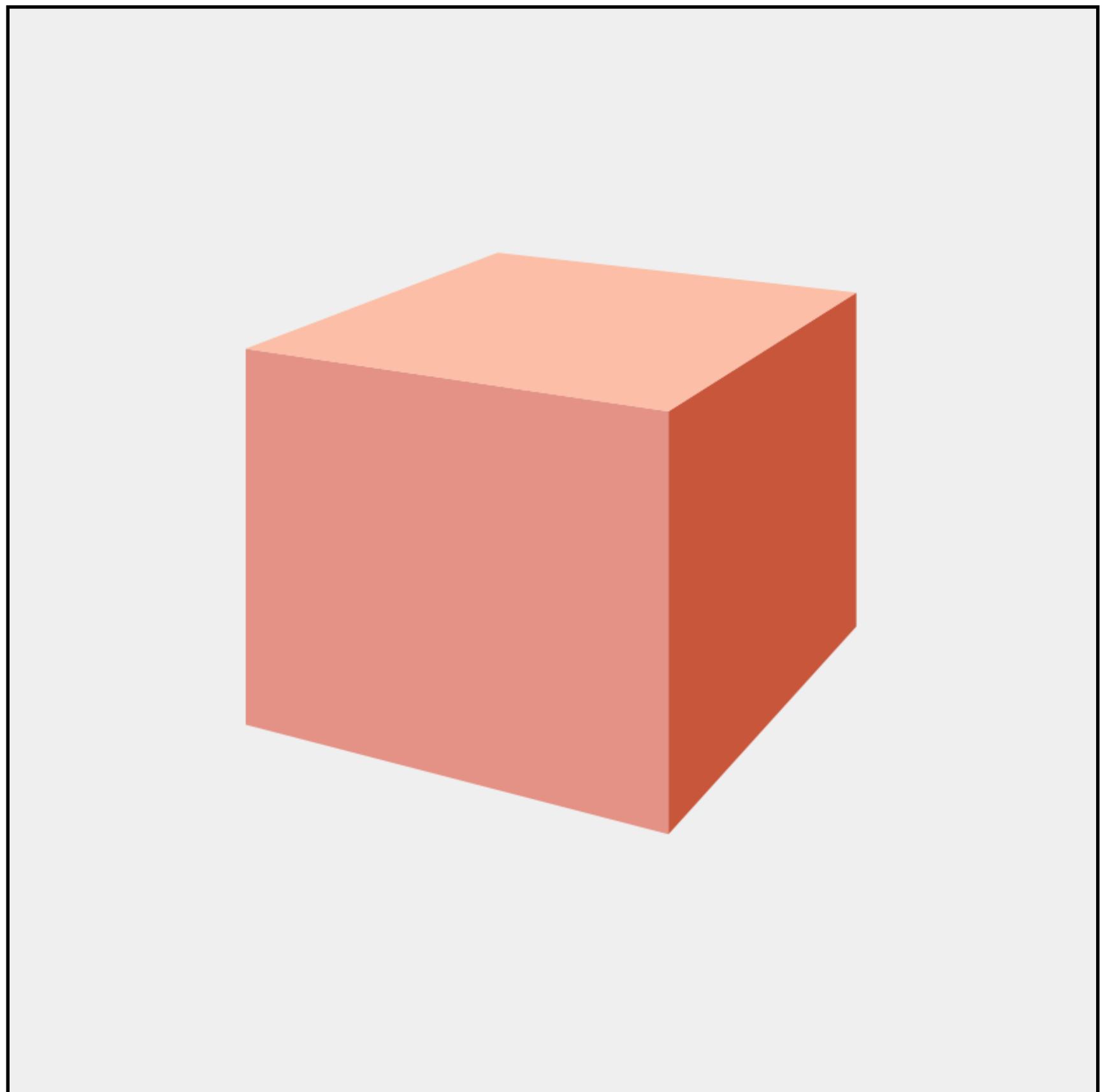




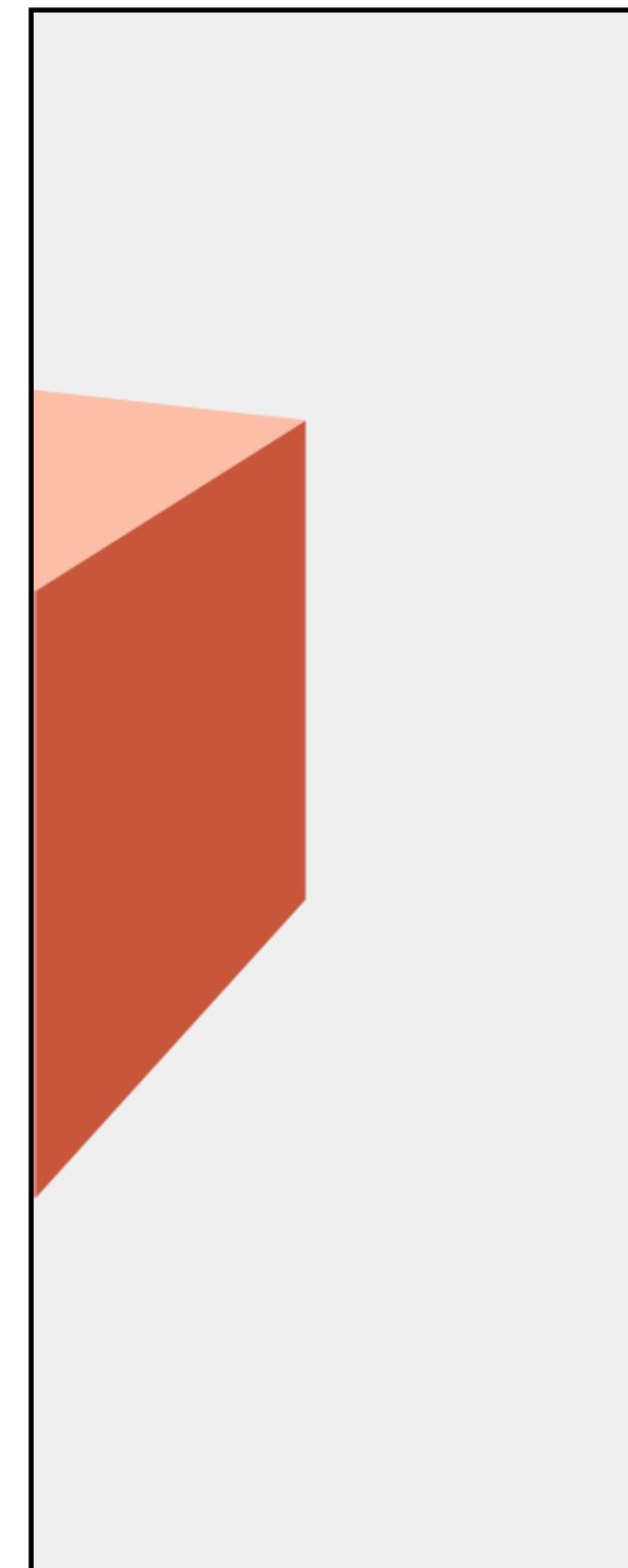
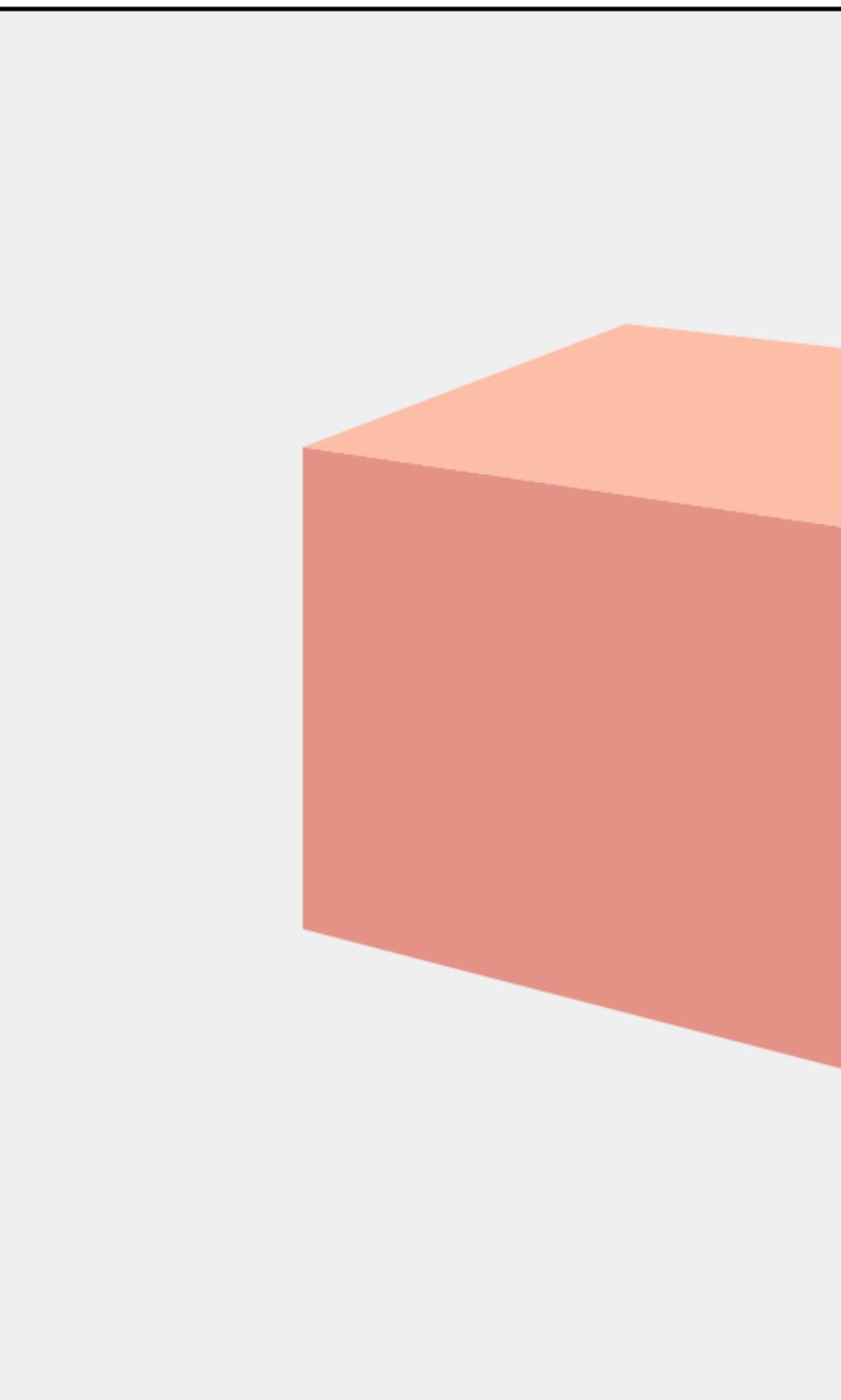




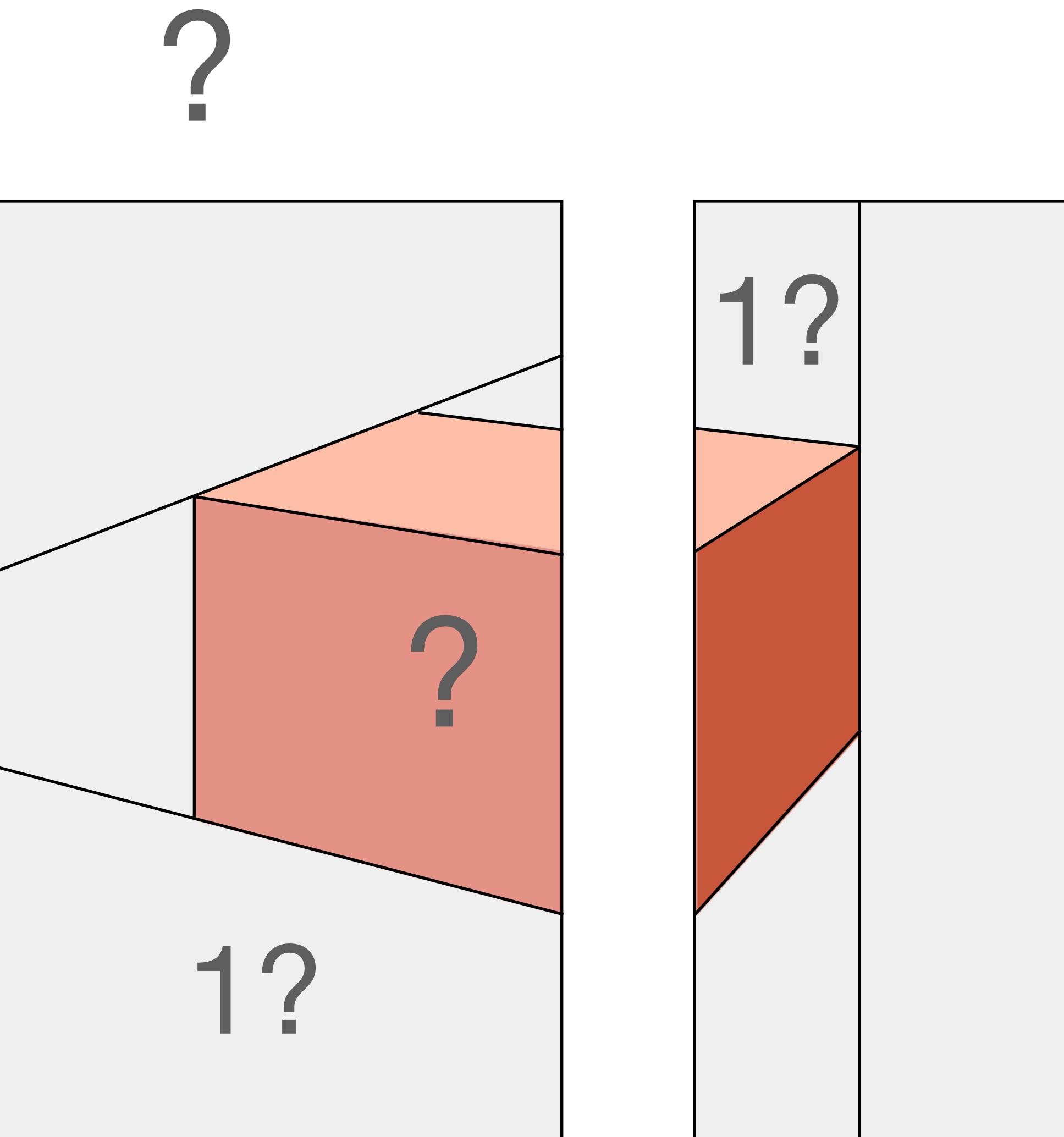
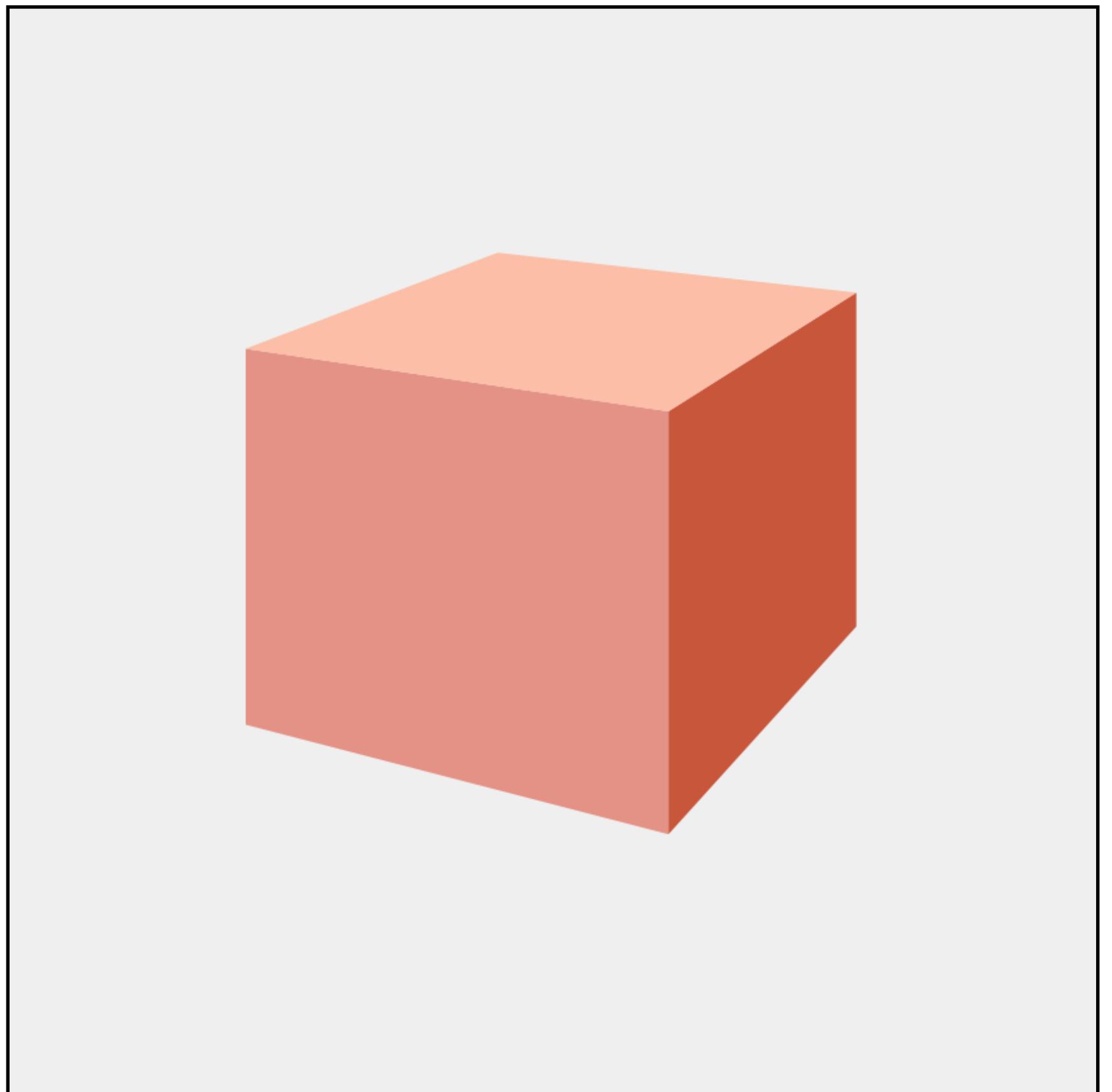
?



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A Mathematical Foundation for Foundation Paper Pieceable Quilts

MACKENZIE LEAKE, Stanford University, USA

GILBERT BERNSTEIN, UC Berkeley, USA

ABE DAVIS, Cornell University, USA

MANEESH AGRAWALA, Stanford University, USA

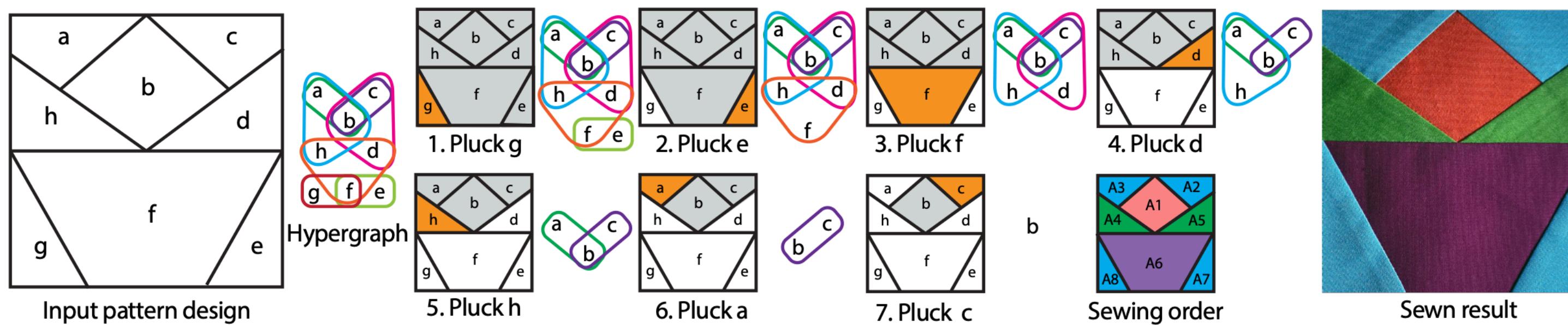
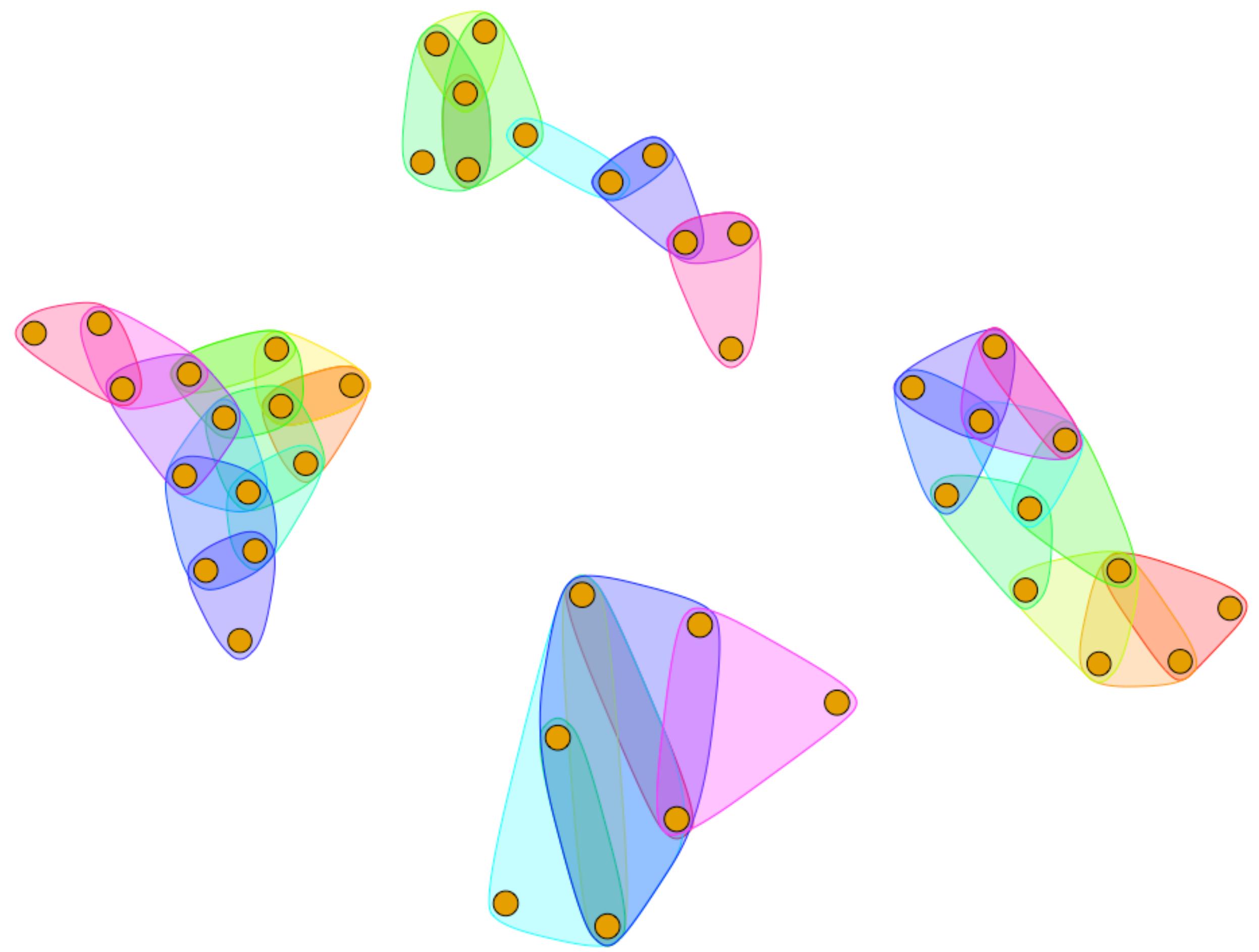
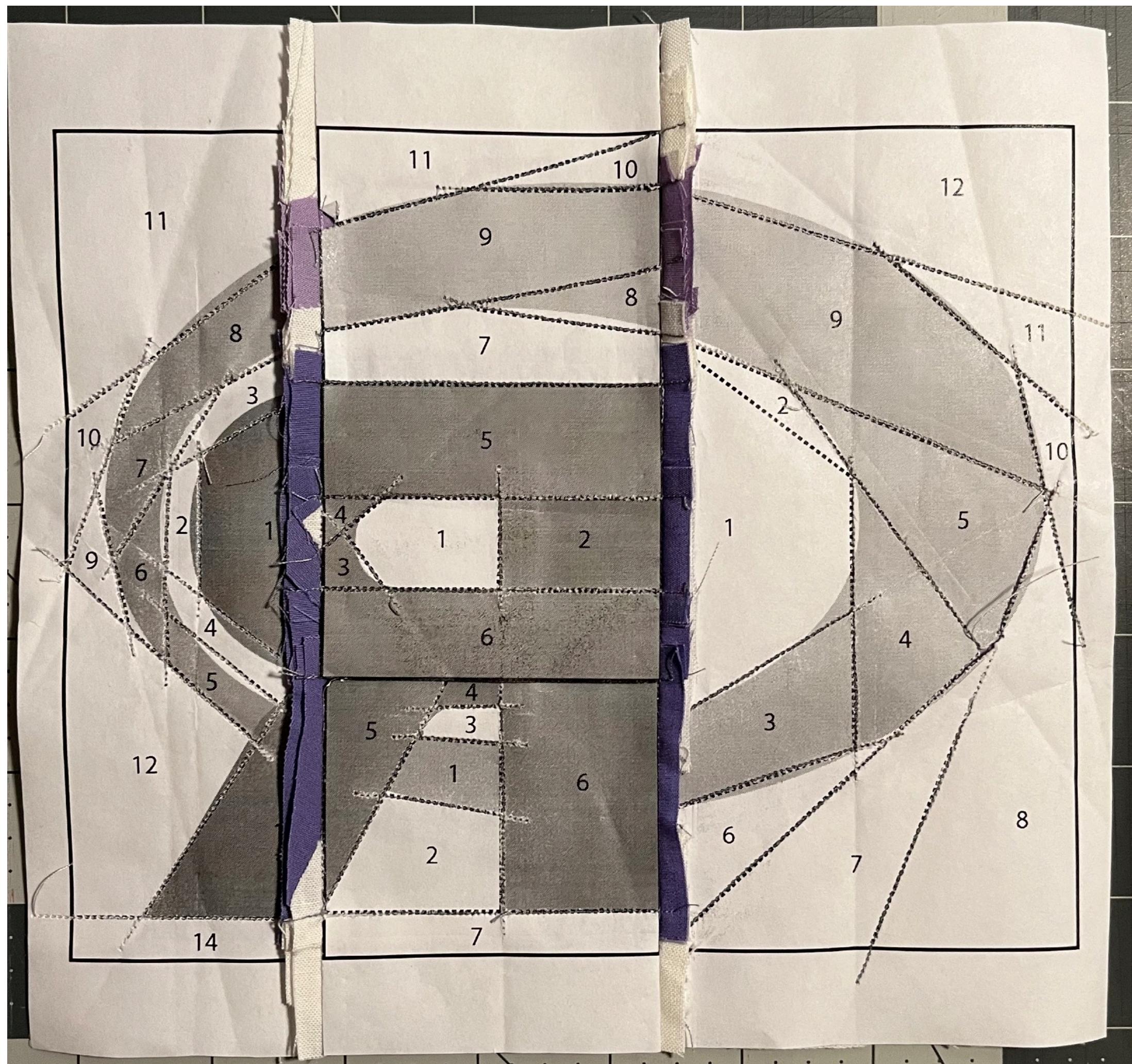


Fig. 1. Given an input pattern design we encode the geometry as a *dual hypergraph*, where nodes represent faces and hyperedges represent *seams* connecting two or more faces. We visualize the hyperedges with colored boundaries (left). In this work we prove that if this hypergraph is acyclic, the pattern design is foundation paper pieceable, and we present a *leaf-plucking* algorithm that iteratively removes leaf hyperedges, where a node is only contained in that hyperedge, to generate a sewing order for the design, which is the reverse of the order in which we plucked the nodes (center). Our quilt design tool shows the resulting sewing order by numbering the faces (center, Sewing order) and lets users color the faces to visualize the design. Quilters can use foundation paper piecing to sew the quilt by attaching fabric pieces one at a time in the sewing order and precisely construct the quilt top (right).

Foundation paper piecing is a popular technique for constructing fabric patchwork quilts using printed paper patterns. But, the construction process imposes constraints on the geometry of the pattern and the order in which the fabric pieces are attached to the quilt. Manually designing foundation paper pieceable patterns that meet all of these constraints is challenging. In

ACM Reference Format:

Mackenzie Leake, Gilbert Bernstein, Abe Davis, and Maneesh Agrawala.
2021. A Mathematical Foundation for Foundation Paper Pieceable Quilts.
ACM Trans. Graph. 40, 4, Article 65 (August 2021), 14 pages. <https://doi.org/10.1145/3450626.3459853>

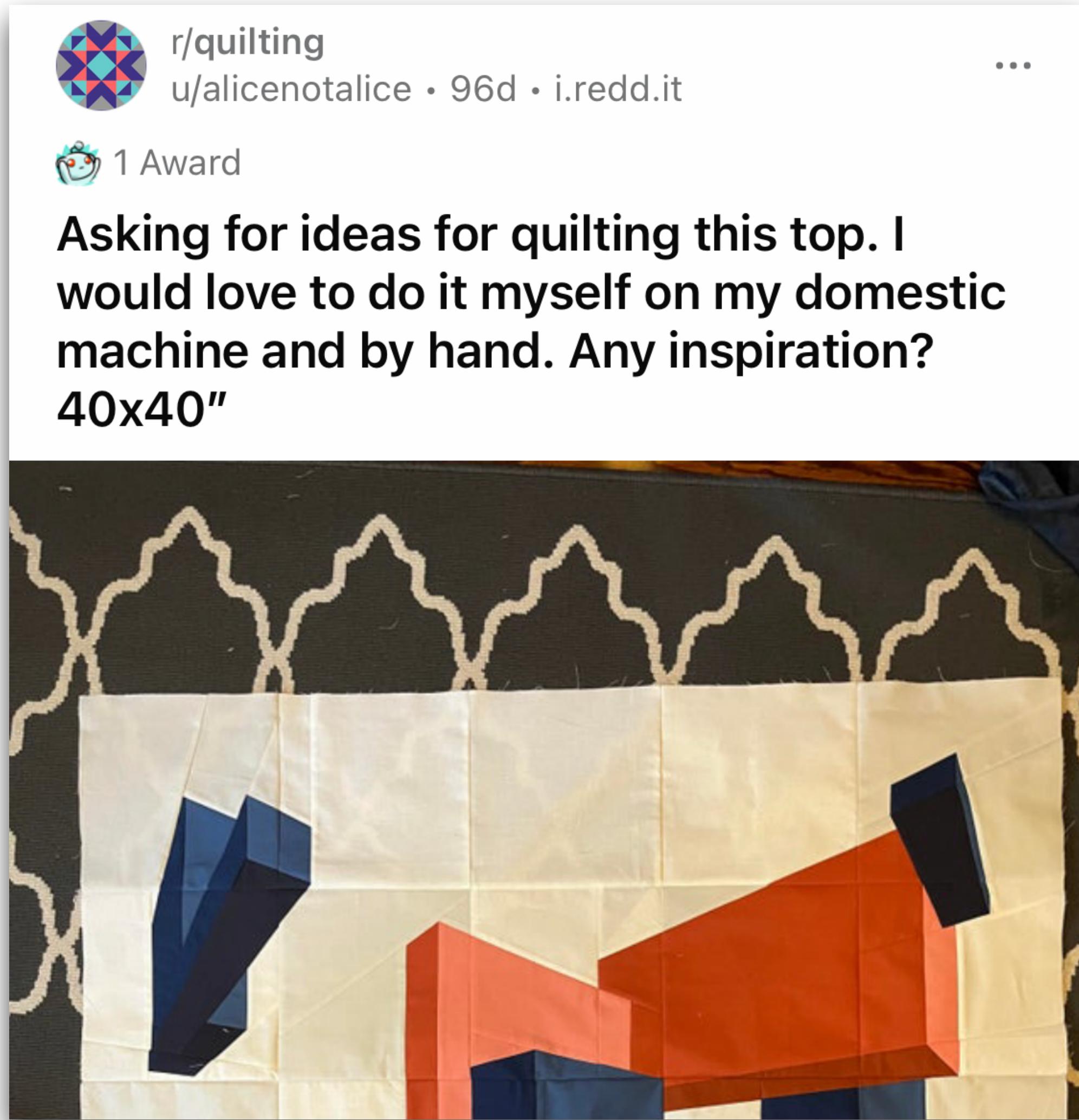


Step 4

Execute



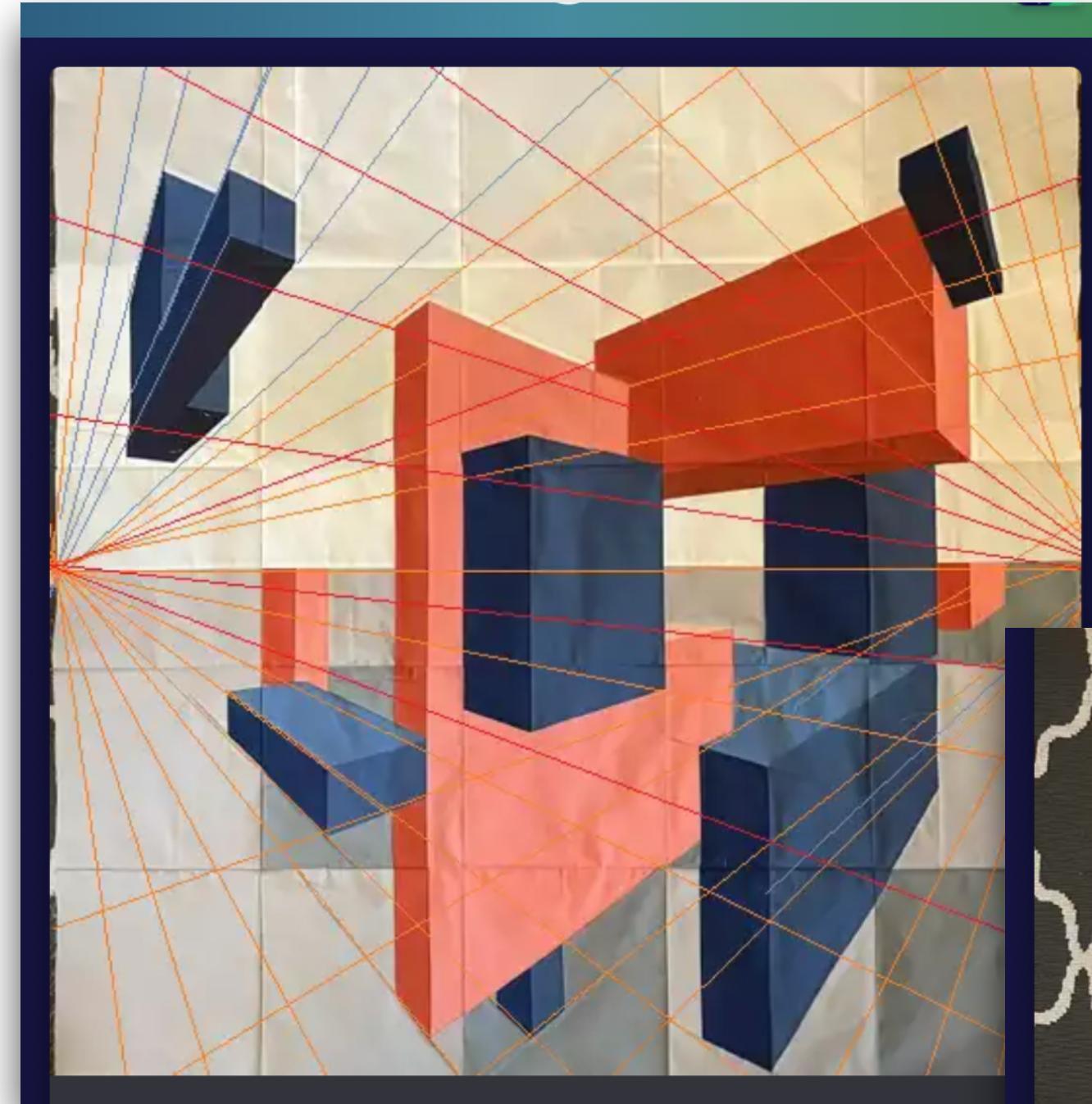
Seek Collaboration



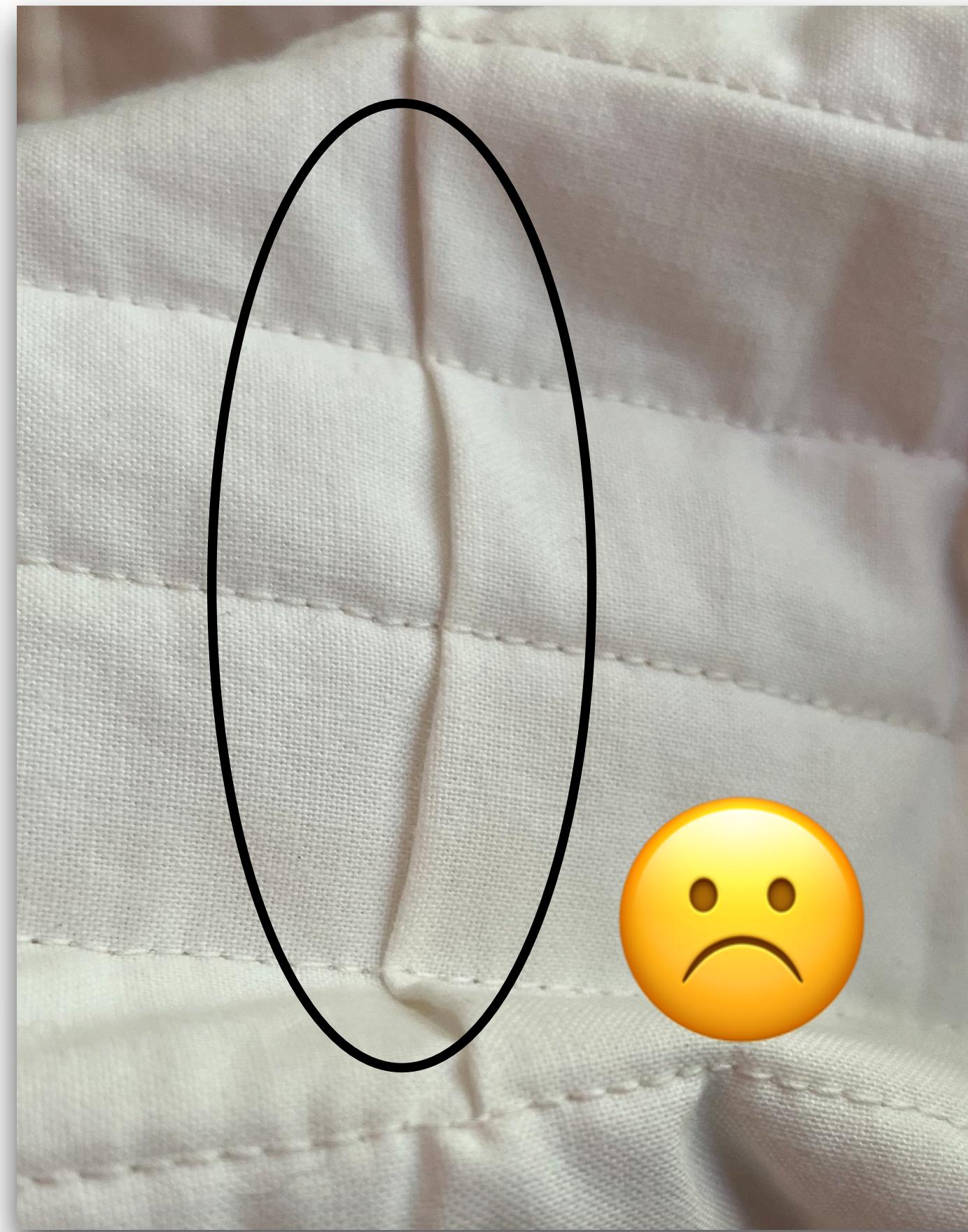
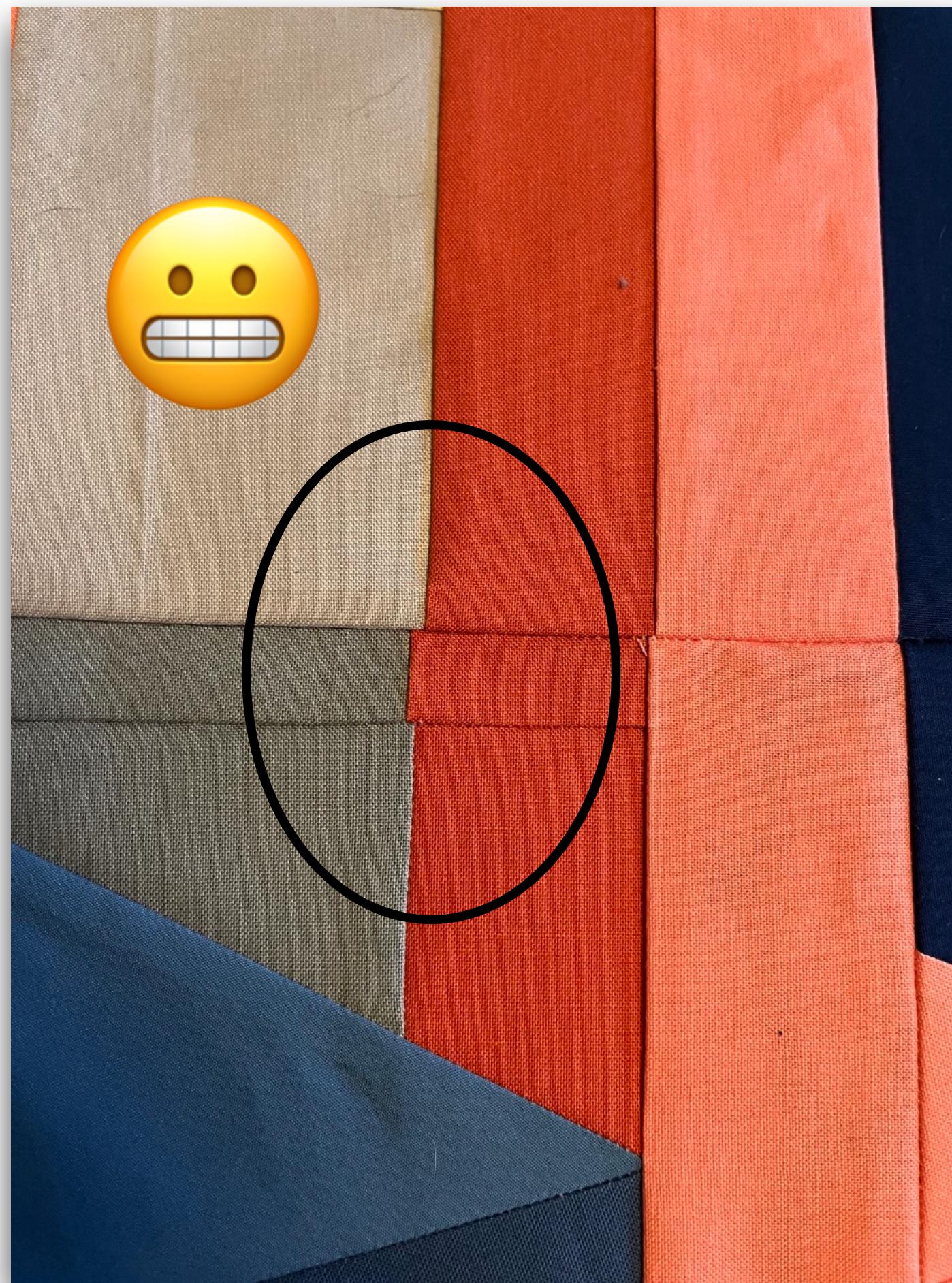
r/quilting
u/alicenotalice • 96d • i.redd.it

1 Award

Asking for ideas for quilting this top. I would love to do it myself on my domestic machine and by hand. Any inspiration?
40x40"



Mistakes are necessary



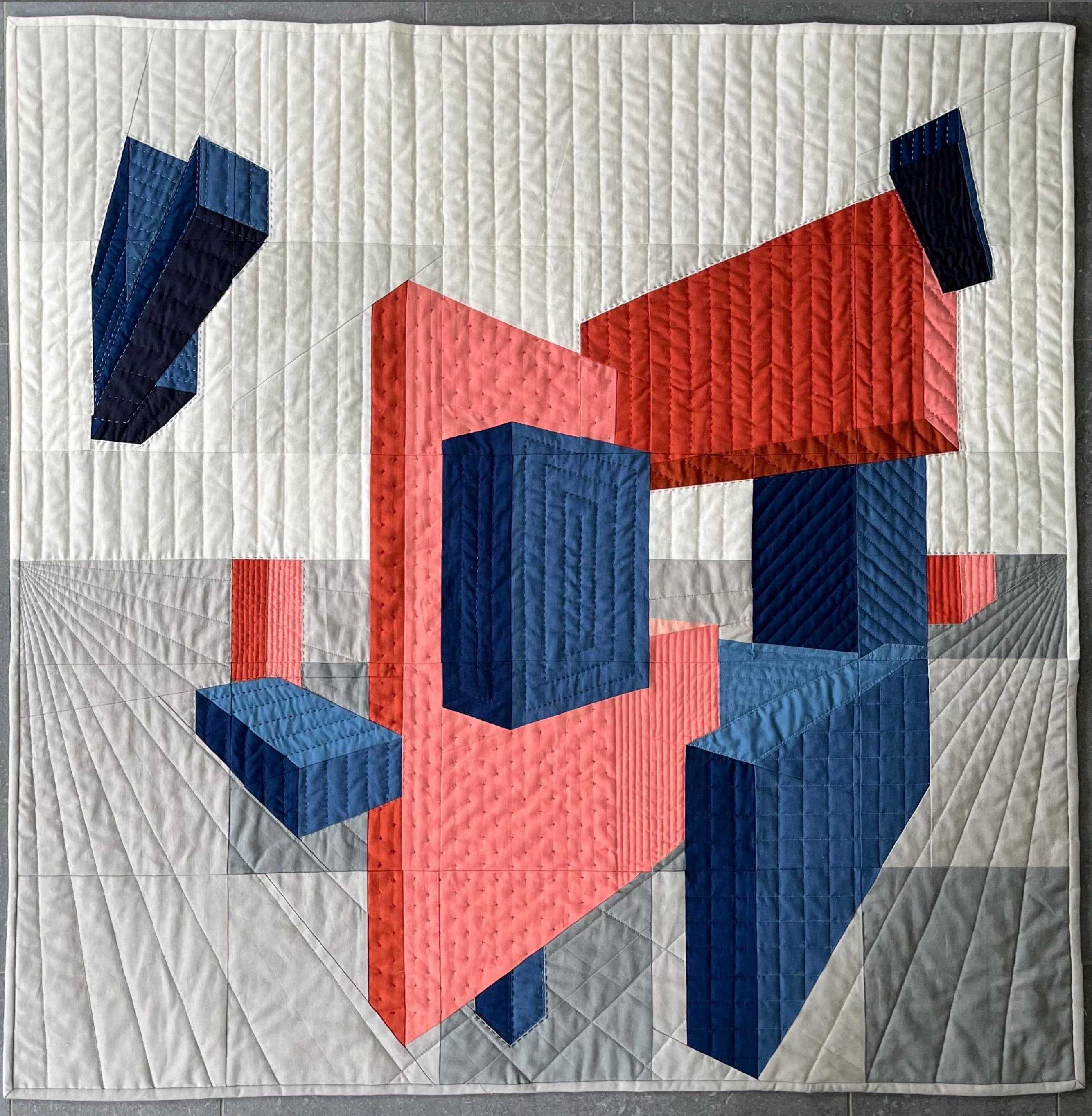
main ▾

- Commits on Jun 12, 2022
 - need to refactor and fix area calc
awalsh17 committed 6 days ago
 - new ideas for photo to fpp. big mess to clean up
awalsh17 committed 6 days ago
- Commits on May 22, 2022



Step 5

Share!



Landscape no. 1
by Alice Walsh

Step 6

Discover the real problem



Designing foundation paper blocks

Choosing fabric

Determining how much fabric



code-generated block pattern





hand-generated FPP pattern

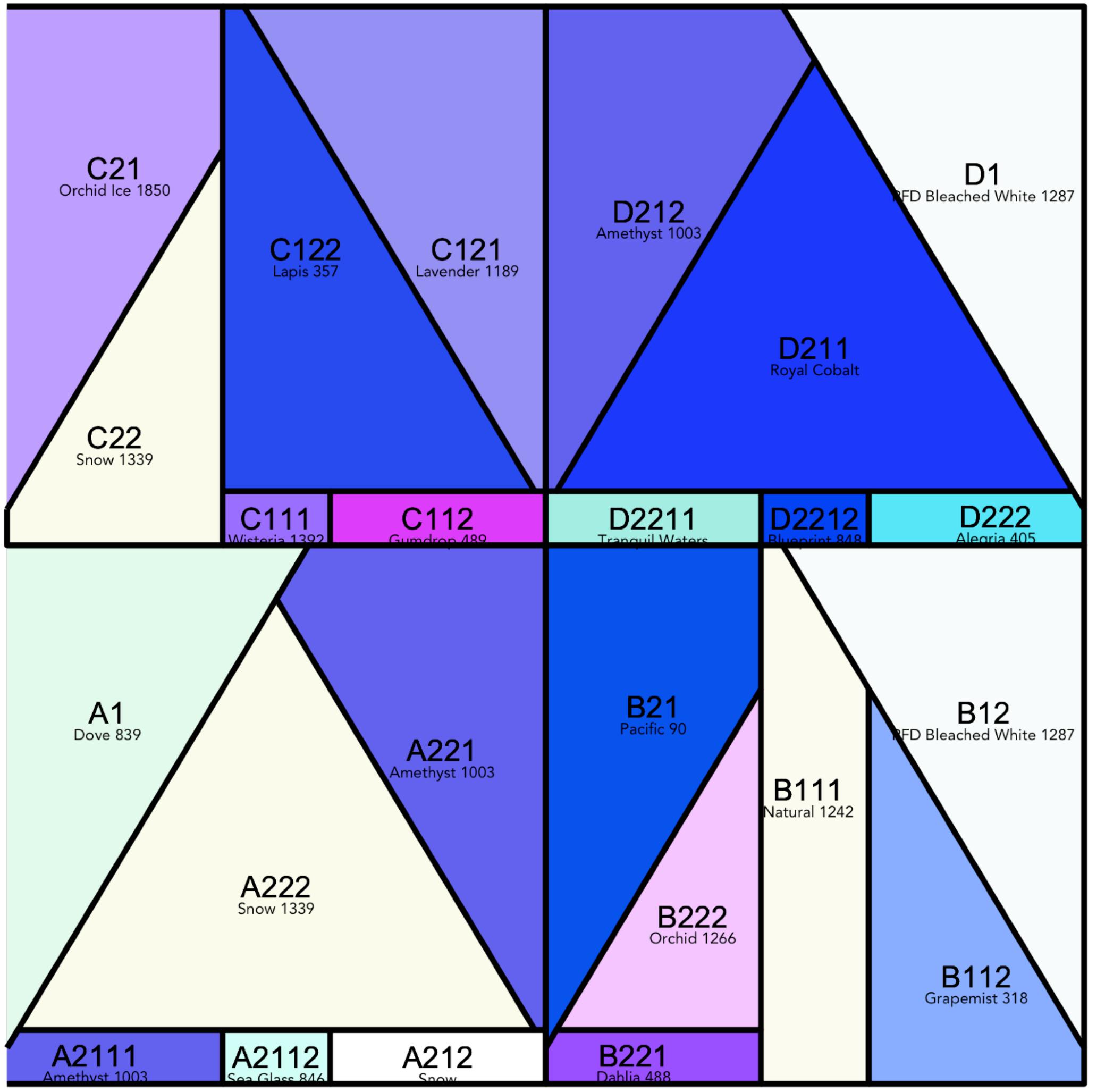




code-generated FPP pattern



code-generated FPP pattern with fabric choices



code-generated FPP self-portrait



1

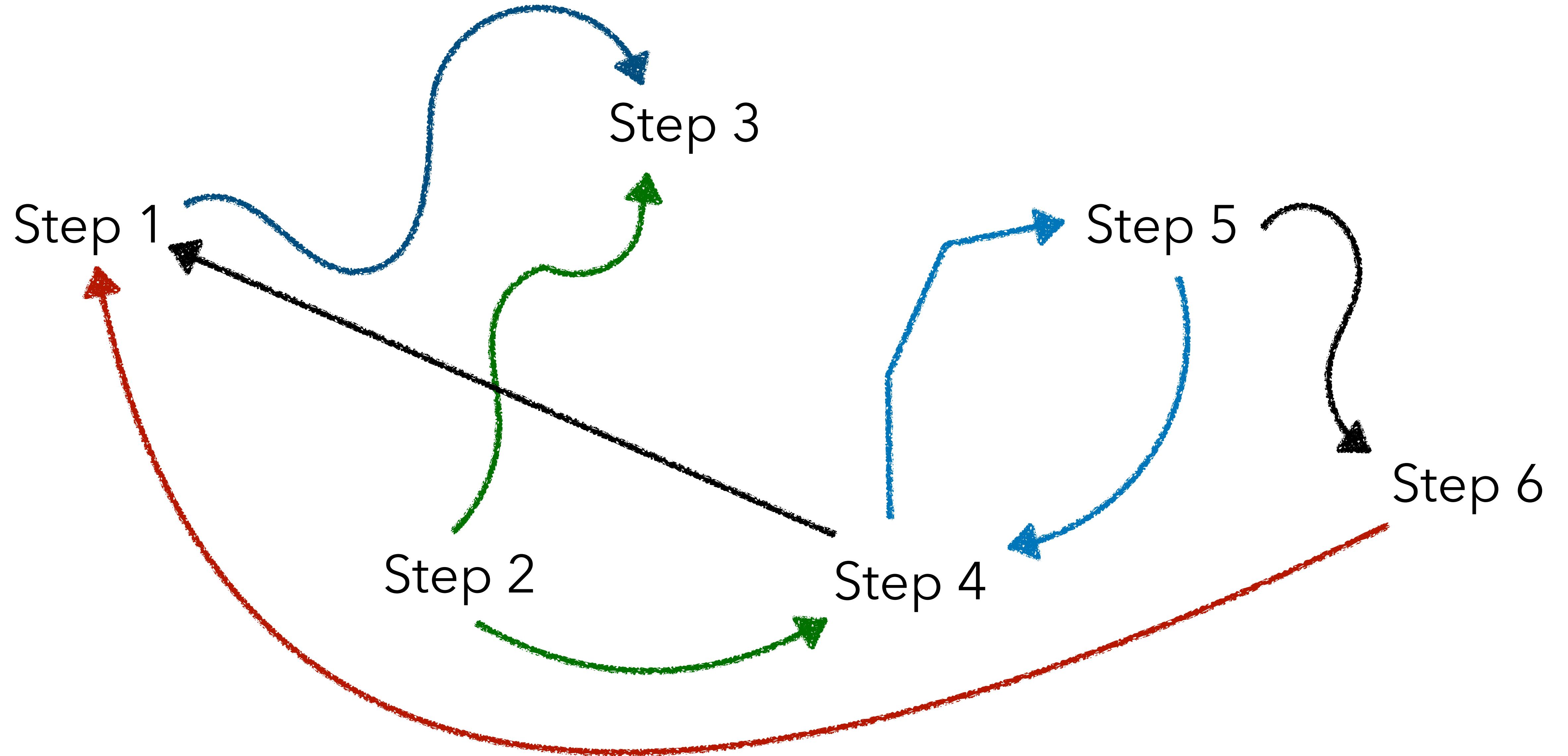
2

3

4

5

6



How to be
more creative

Would you rather be
a pizza delivery person?
or
a plumber?





Would you rather be

a detective?

or

a criminal?



For the **detective** the crime is given,
the **problem formulated...**

Einstein and Infeld, The Evolution of Physics

The **scientist** must
[...] **commit his own**
crime, as well as
carry out the
investigation



Einstein and Infeld, The Evolution of Physics

How to be more creative

- Be a plumber
- Commit some (science) crimes
- Get exposure to new ideas
- Celebrate mistakes

Thank You!

- *Explaining Creativity: The Science of Human Innovation* by Keith Sawyer
- Zig Zag by Keith Sawyer
- *Spark: How Creativity Works* by Julie Burnstein
- Stiny, George, and James Gips. "Shape grammars and the generative specification of painting and sculpture." *IFIP congress (2)*. Vol. 2. No. 3. 1971.
- Leake, Mackenzie, et al. "A mathematical foundation for foundation paper pieceable quilts." *ACM Trans. Graph.* 40.4 (2021): 65-1.
- Joe Szustakowski (pizza versus plumber metaphor)
- PAFA Continuing Education instructors: Fred Kaplan, Charles Muldowney, and Al Gury



Slides & code are available at
github.com/awalsh17/quiltR/



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