Unit Chats

Topics: Mental math, numerical fluency; argument & critique
Materials: White board or projector
Common Core: Variable, but especially MP3, MP1, and NBT

Counting with respect to different units.

Why We Love Unit Chats

Unit Chats are a kind of Number Talk that emphasizes not just how many, but also the unit involved. These are a fantastically productive, fun, differentiated, and delightful warm up for math.

The Launch

Post a Unit Chat image. It should have different kinds of objects to count in it, and be arranged in arrays or other structures as appropriate for the student level. Students get some time to look at what is in the picture, and how many of which object they see. After they've had 20 - 60 seconds to look, ask students what they see. You'll receive different answers about what they saw, and how many. You can ask students to explain different ways of counting what they saw, and also different things that they see to count in the picture.

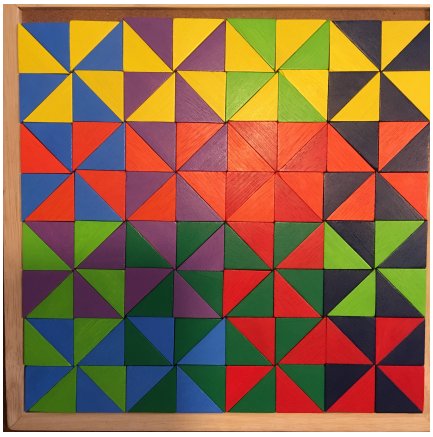
Example Unit Chat (Grades K-3)

Photo credit: Christopher Danielson

Teacher: Take a look at this picture. Let's take a minute, and think about all the things we see. [Waits for 30 seconds.] Well?
Student: I see avocados.
T: How many avocados do you see?
S1: I see fifteen.
T: Fifteen avocados. I don't see that at all.
S1: Look, there are five on the top, then another five, and then five on the bottom. So that's 15.
T: Ah! You're talking about the *avocado halves*. In that case, I agree. That's 5, 10, 15 avocado halves. What else do you see?
S2: They're in a checkerboard pattern.
T: That's true. The pitted avocado halves and the unpitted avocado halves form a checkerboard. Does that mean there are the same number of each?
Students: Yes! / No!
S3: There are 8 with pits.
T: Let's count. 1, 2, 3, 4, 5, 6, 7, 8. That's right. Did you count one by one?
S3: No, I saw the 3 on the top, plus 2, plus 3.
T: Ah, and 3 + 2 + 3 = 8.
S4: There are only 7 without pits.

T: It's strange that it would be different if they were in a checkerboard pattern. I still don't see why there are more with pits than without.
S4: Because the first and last have pits. If there were one more row, it would be the same.
T: I think I see. You're saying it goes "pit, no pit, pit, no pit,…" But it ends on "pit" and starts on "pit," so there's an extra.
S5: One "no pit" got thrown away.
T: What do you mean?
S5: There were eight avocados that got cut in half, but one no-pit half isn't there.
T: How do you know?
S5: Because if you put all the halves together, it would make wholes, and there would be eight wholes. But the last no-pit half is missing.
T: So how many whole avocados are there?
S6: Seven and a half.
T: I see. So we could see this as 15 half avocados, or we could see it as 7 and a half whole avocados. Very neat!

Example Unit Chat (Grades 3 - 5)



Teacher: Take a minute to look at this image. What do you see? [Takes 45 seconds, then calls on a student.]
Student 1: There are a lot of triangles.
S2: I see squares.
T: How many squares do you see?
S2: 16.
S3: No there are more than that! Look at the squares between squares!
S4: Woah! There must be a bunch of them.
T: But you said 16, and there are definitely 16 of something in here.
S2: I meant just *those* squares.
T: You mean the non-overlapping squares that look like pinwheels?
S2: Yeah!
T: How do you know there are 16 non-overlapping pinwheel squares?
S2: Because its 4 on the top, and 4 on the side, and 4 x 4 = 16.
T: So you see a 4 by 4 array of non-overlapping squares, which gives us 16. Great! What else?
S5: I see 16 yellow triangles.
T: How?
S5: Well, there are 4 in each of the squares on the top…
S2: The non-overlapping squares.
S5: Right. So that makes 4 yellow per square, so that's 4 x 4 = 16 again.
S6: That's the same as two yellow squares.
T: Wait. What?

S6: Each of the squares with yellow is half yellow, so if you blended two of them together, you'd get a yellow square. So if you blended those two, you get 1 yellow square, and if you blended those two, you'd get two yellow squares.
T: Woah. Ok, that's pretty subtle. Quickly turn to a neighbor and see if you can figure out what S6 is seeing in this picture.
[Students turn and talk.]
S7: Another way to see it is that each square is made of 8 triangles, and we already know there are 16 yellow triangles, so that's 2 yellow squares, since 16 ÷ 8 = 2.
T: Nice to have another way to see it!
S8: There are two green squares too, if you put the 16 green triangles together.
S9: There are two of each square.
T: Are you sure?
S9: No… but, hmmm… let's see.
T: Let's take a minute and check. Are there two squares of purple?
S10: Yes! Because there are 4 half-squares.
T: And 2 squares of light green?
S11: Yep!
T: So maybe you're right. So I have a question that will take us into our main lesson for today: [How many little triangles are there in all?/What fraction of the whole image is yellow?]

Prompts and Questions

- How did you see that?
- How did you count that?
- Does anyone else think they can explain what Therese is saying?
- Turn to the person next to you and see if you can see what Dwayne is describing.

Tips for the Classroom

1. Use images that are accessible to everyone. The best images have some easy things to count and some harder things to count.
2. You can emphasize how students counted, or shift the conversation to what they counted, depending on what will be the most engaging and enlightening. It can be okay if Unit Chats turn into something that resembles a Number Talk.
3. Remember: doing more short Unit Chats is better than doing just a few long ones. Aim for 5 - 10 minutes. You can use multiple images if they go super short, but often one image is plenty.

Unit Chats

For unit chats, the best prompt is simply “How many?”

The opportunity is that the images contain different choices for what to count. This means the conversation can differentiate as students decide what they want to count, and also connect these choices via multiplication and division.

The unit chat images below go roughly from less difficult to more difficult. Feel free to use them in the order that works for you and your students.

In general, 1 - 2 unit chats is right as an opener.

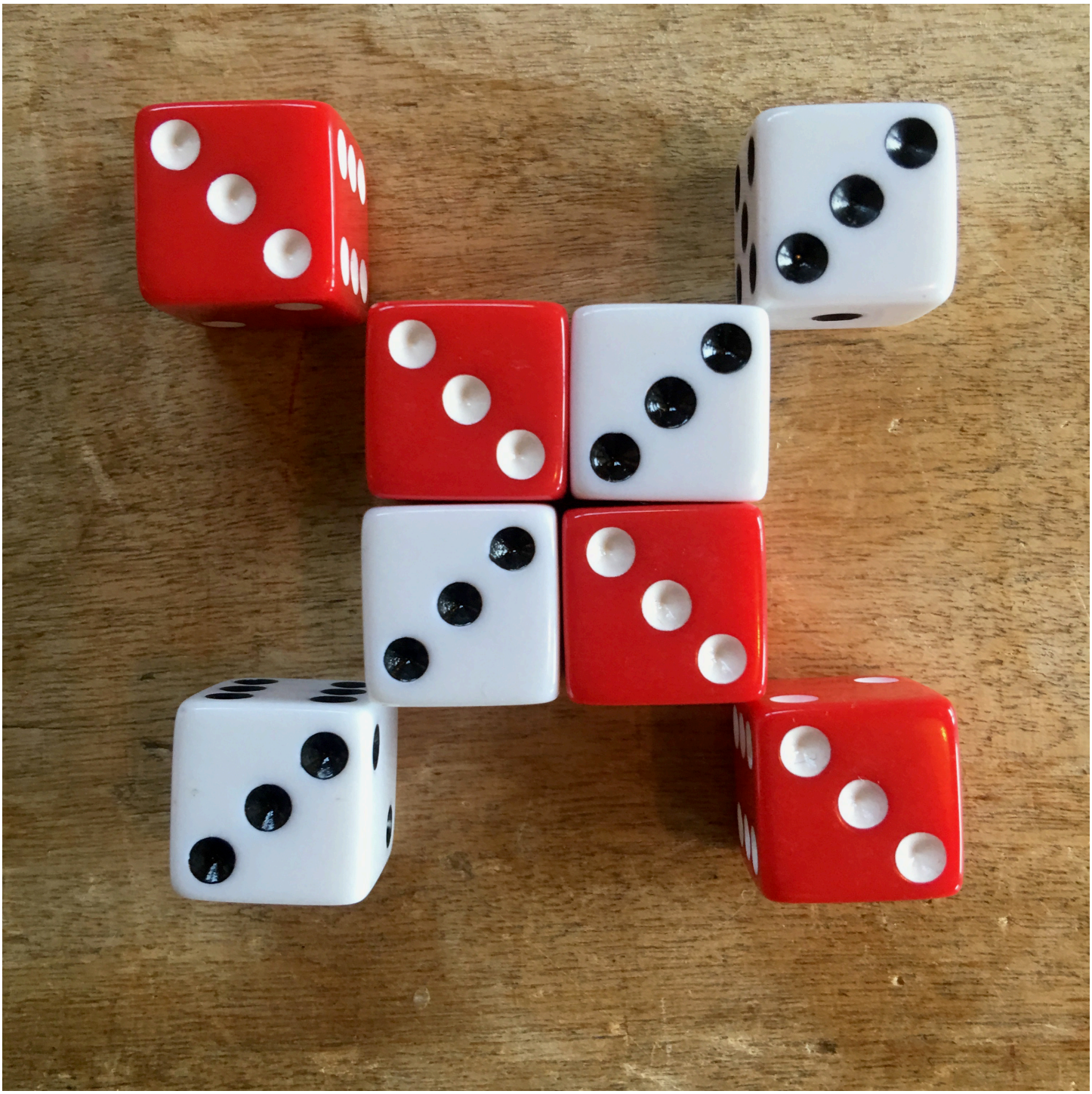
Type of Image	**Natural things to count**
Dice	number of dice, number of dots, and colors
Dominoes	number of dominoes, number of dots, lines on the dominoes.
Cuisenaire rods	number of rods, total number of rods if they were all replaced by white rods, number of each color.
Pattern blocks	number of blocks, number of each color block, number of triangles, number of triangles that would cover the shape

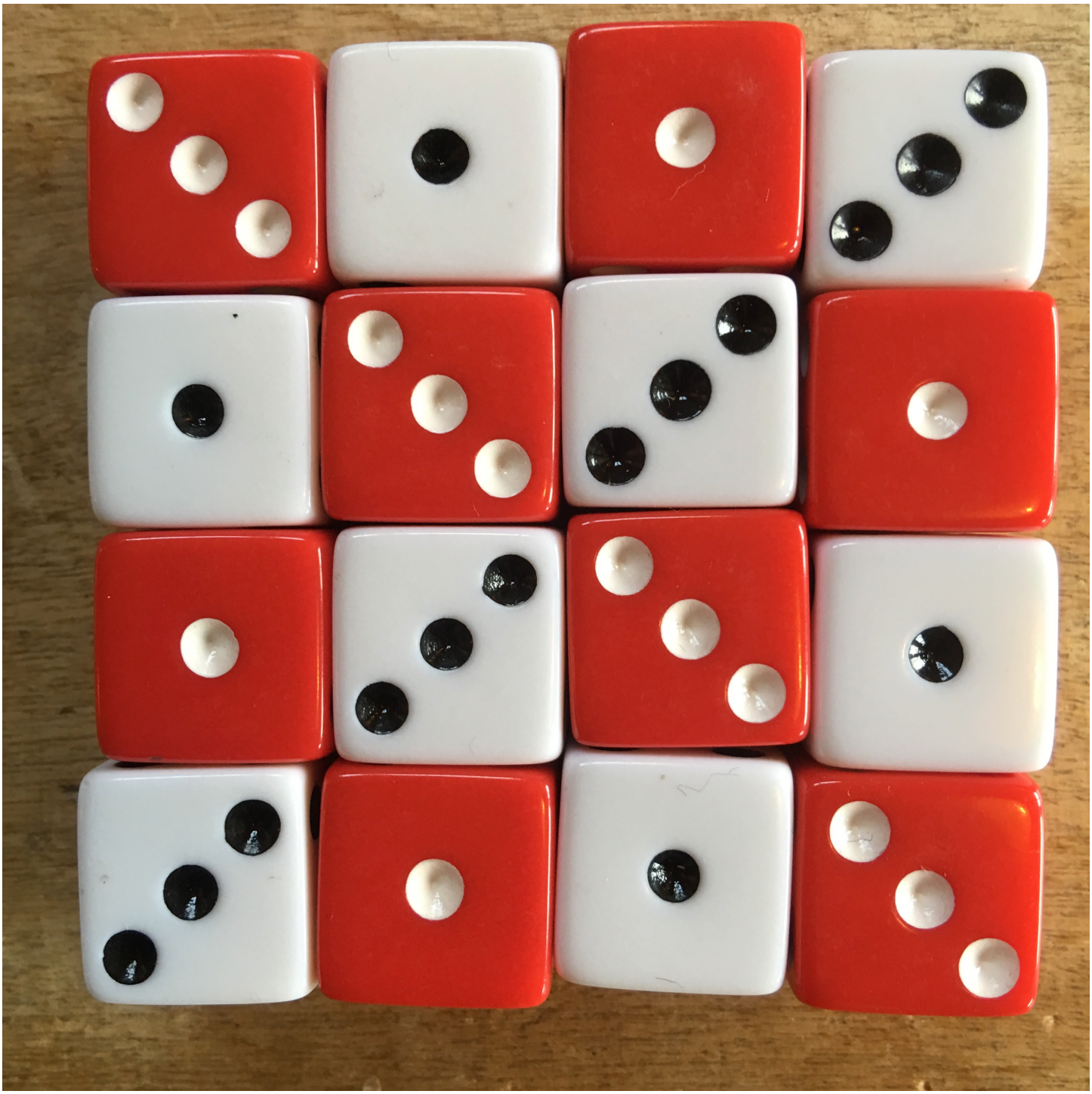
Teachers - please use in your classrooms!

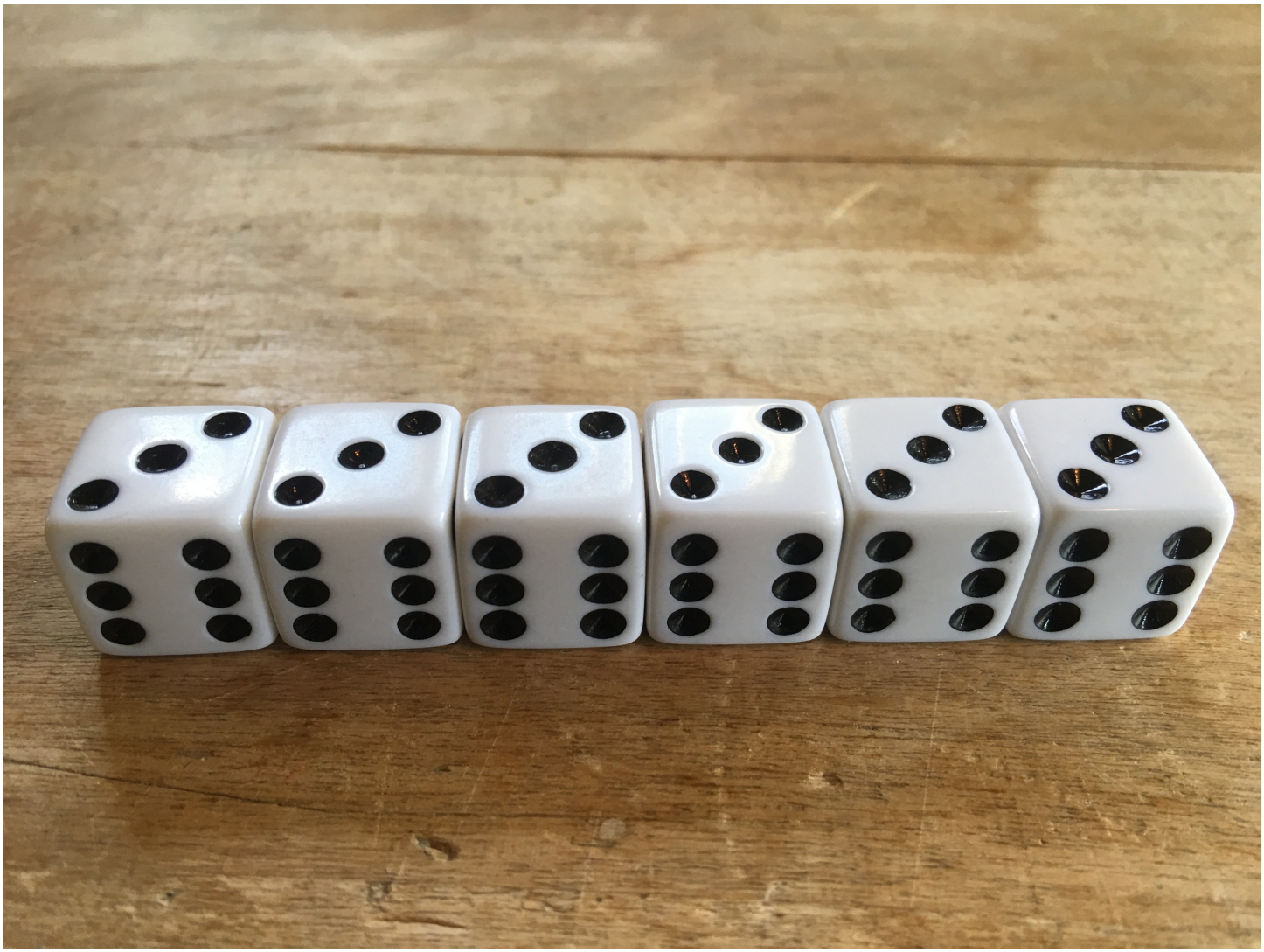
To share, please refer colleagues to
mathforlove.com/lesson/unit-chats

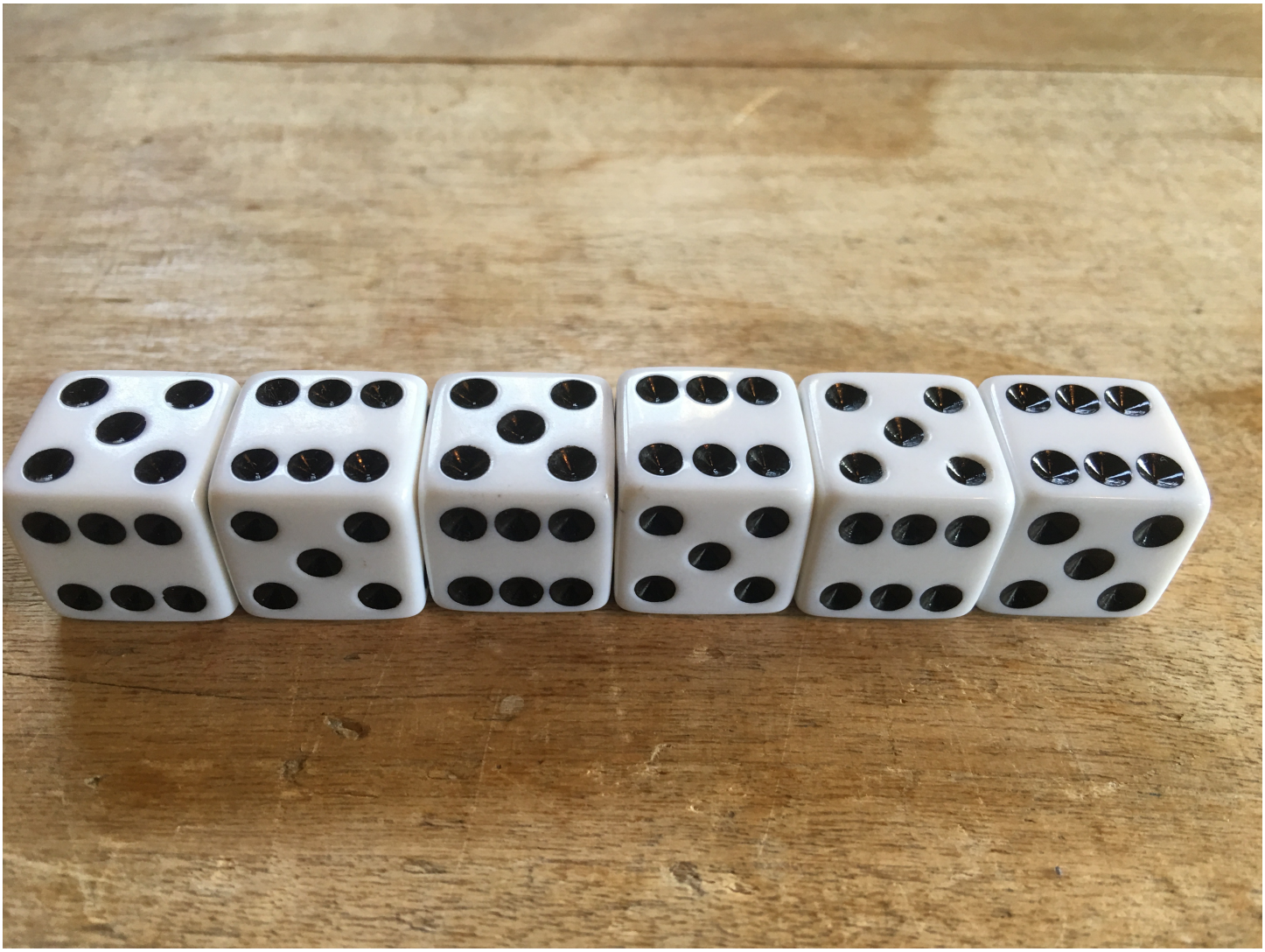
Credit is due to Christopher Danielson for inventing Unit Chats and writing the first book on how they work. The image of avocados on the following page is his, used with permission. His book is pictured below, with the accompanying teacher's guide.

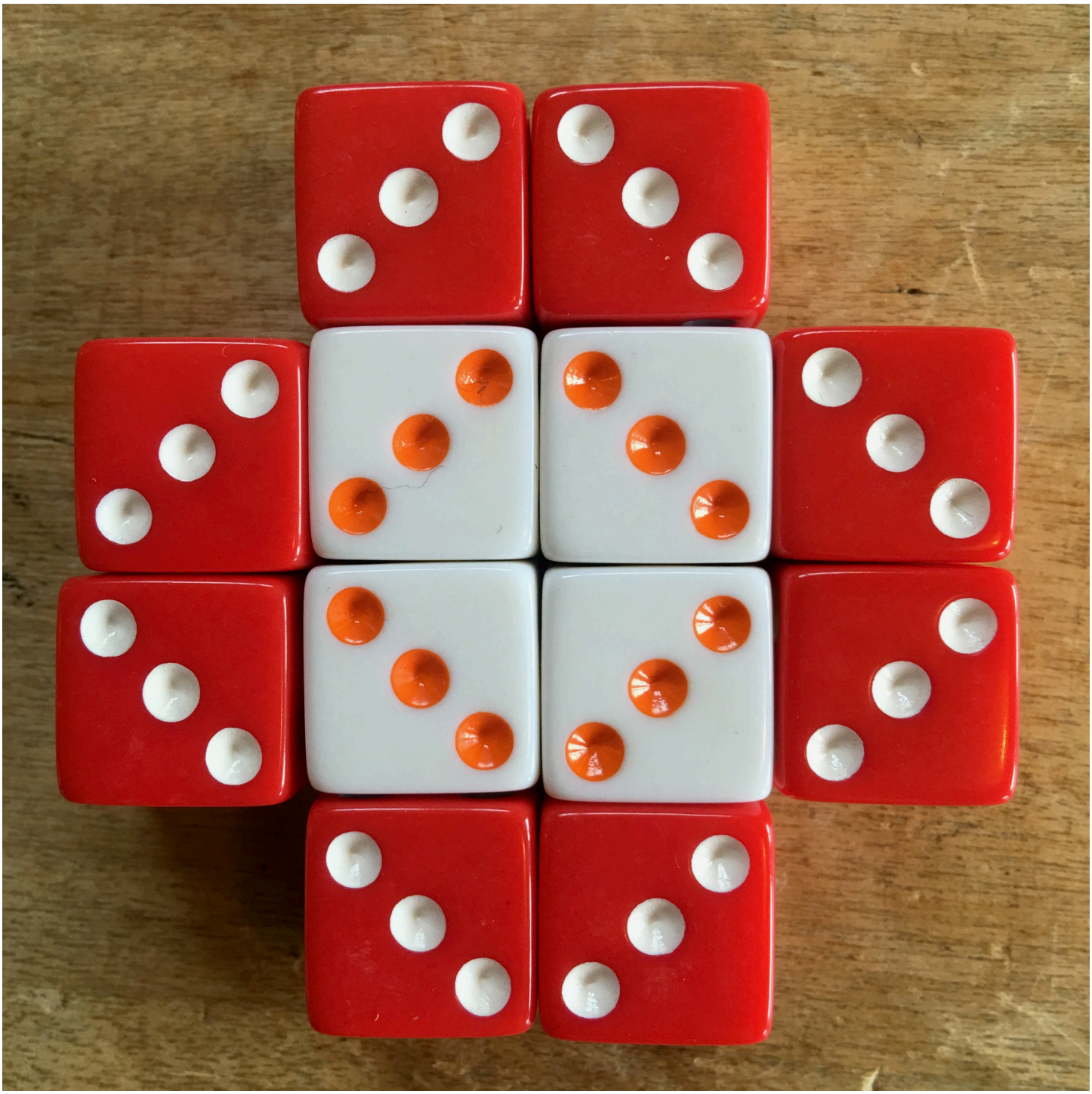
Thanks to Christopher Danielson for this image. This text should be on the left when you display this image only.

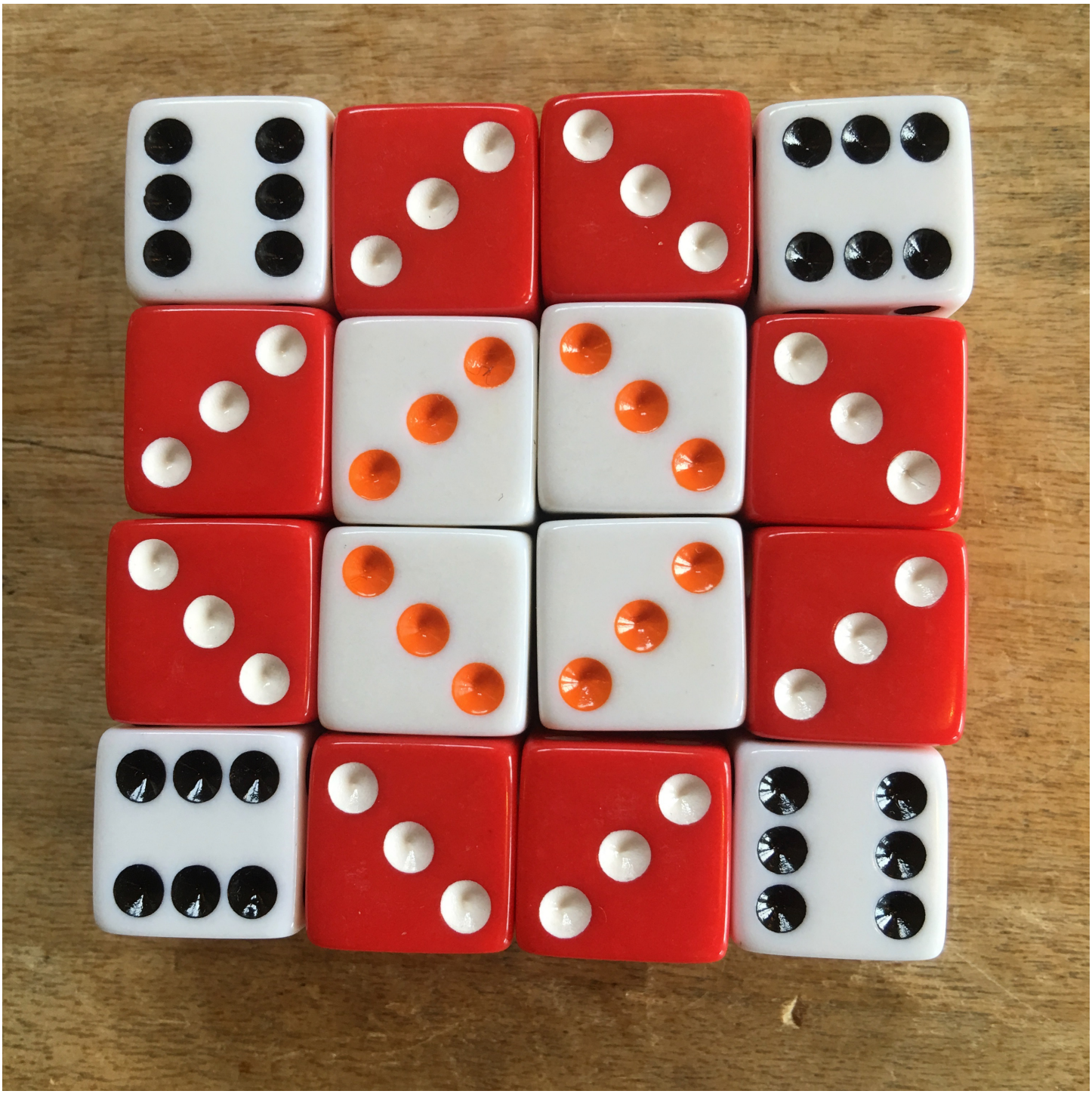


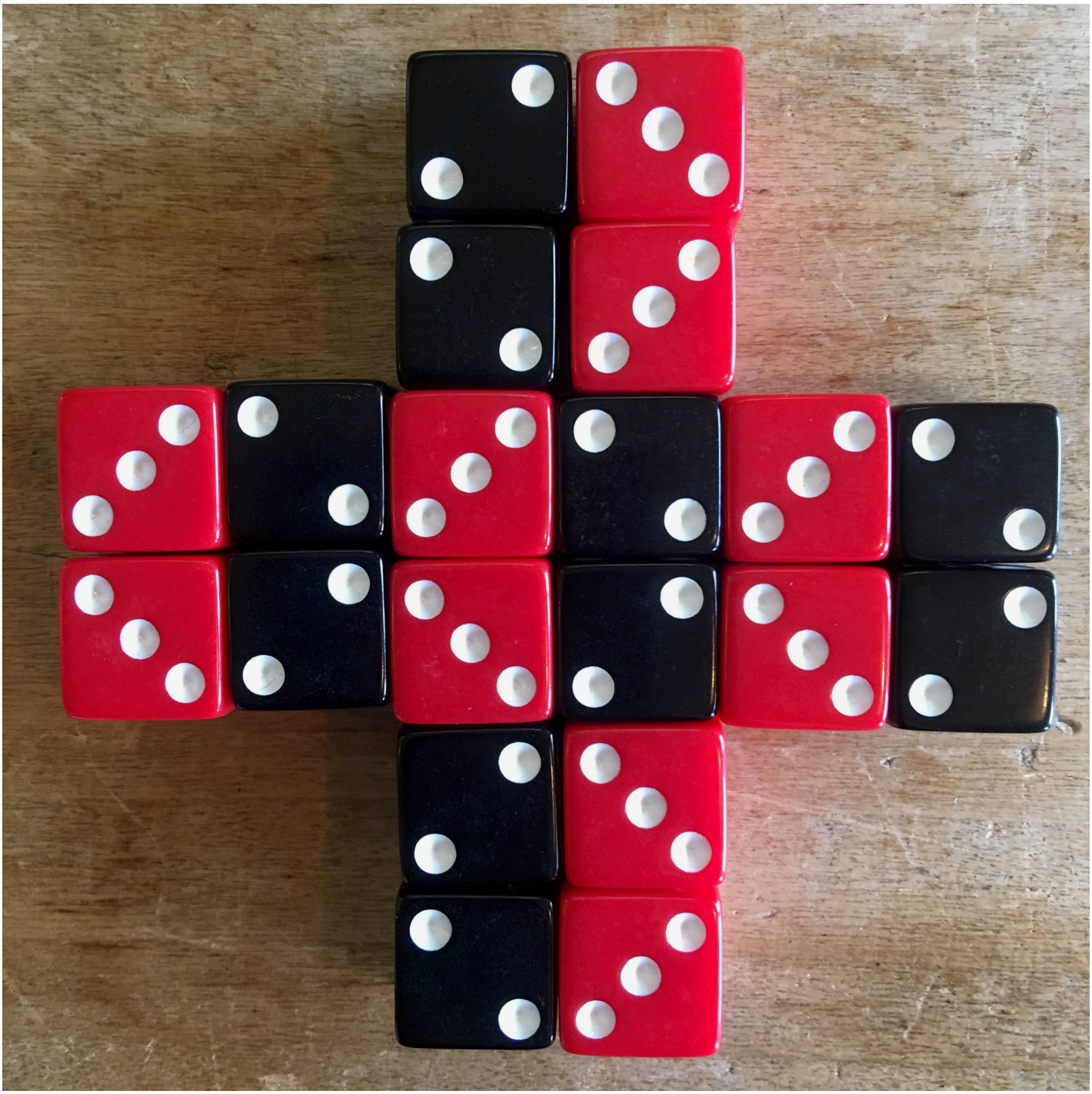


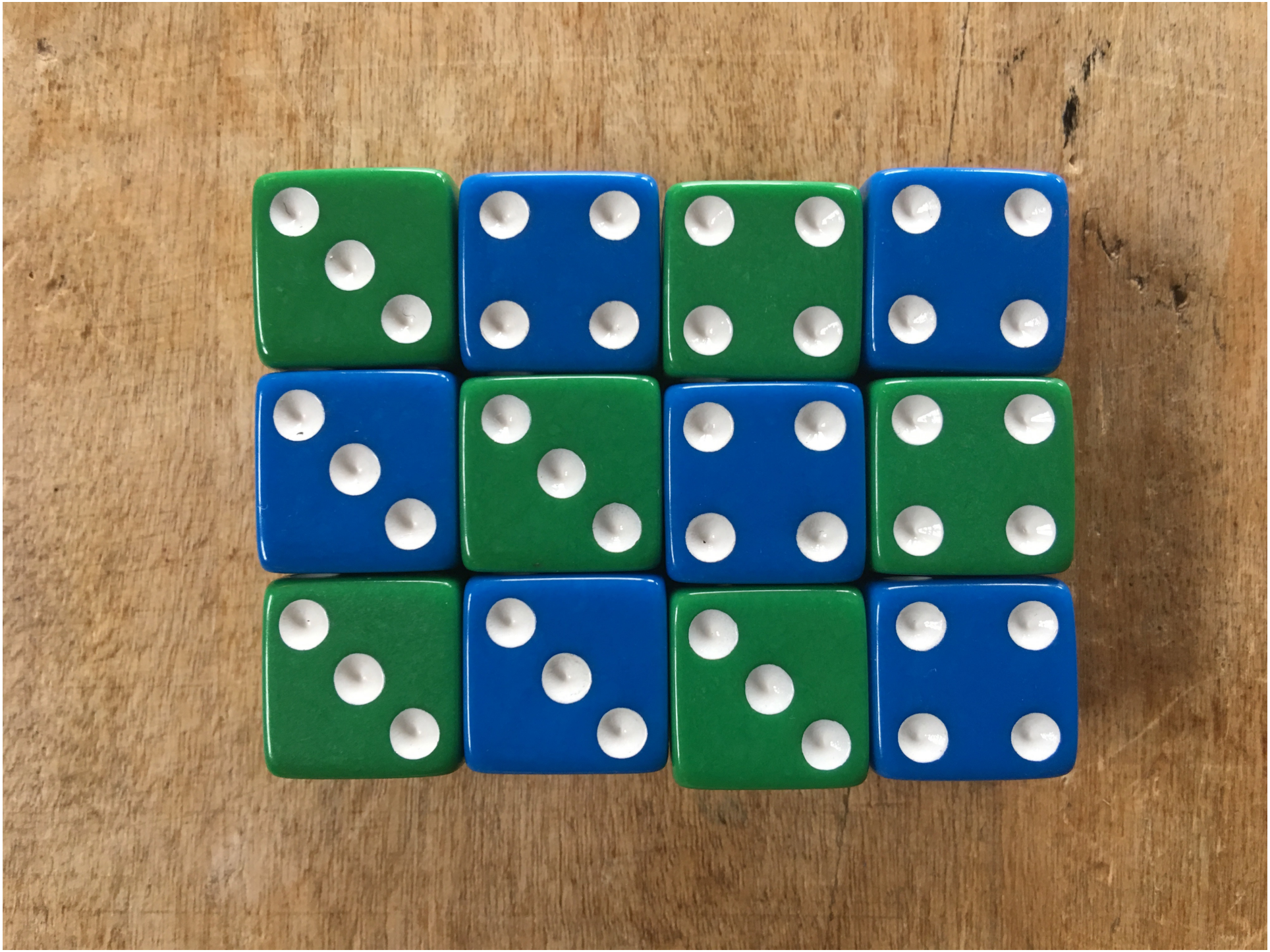


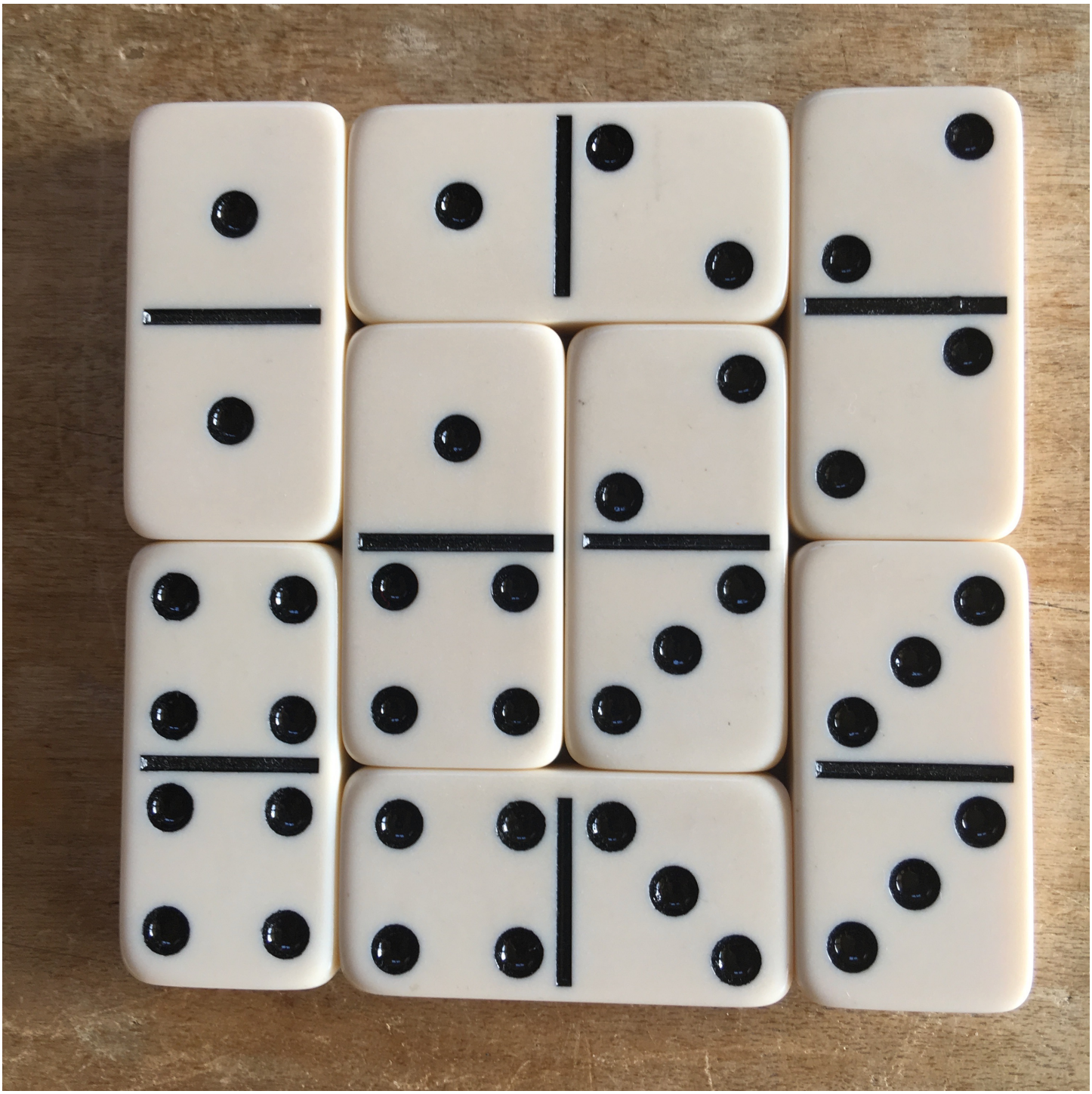


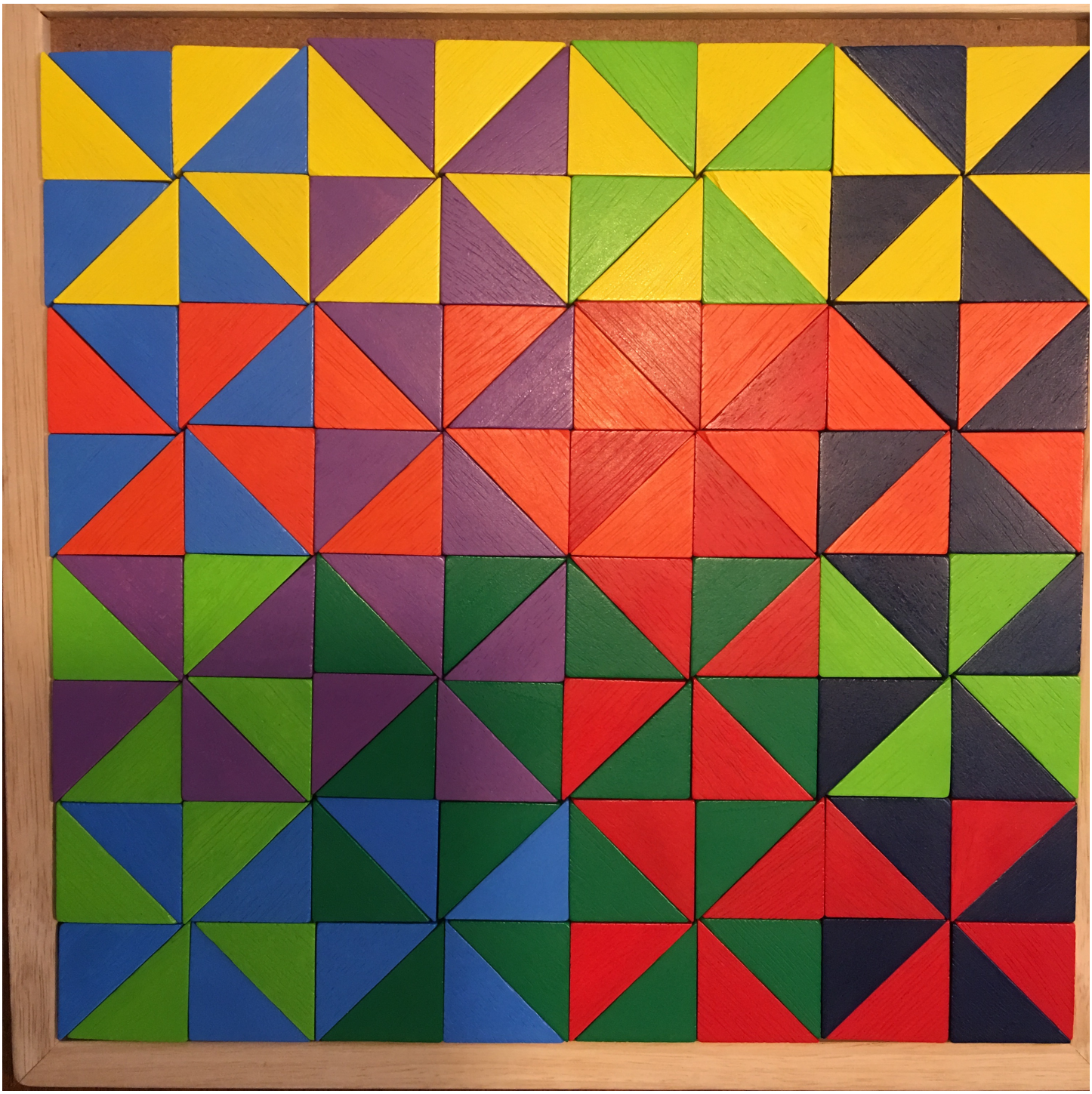


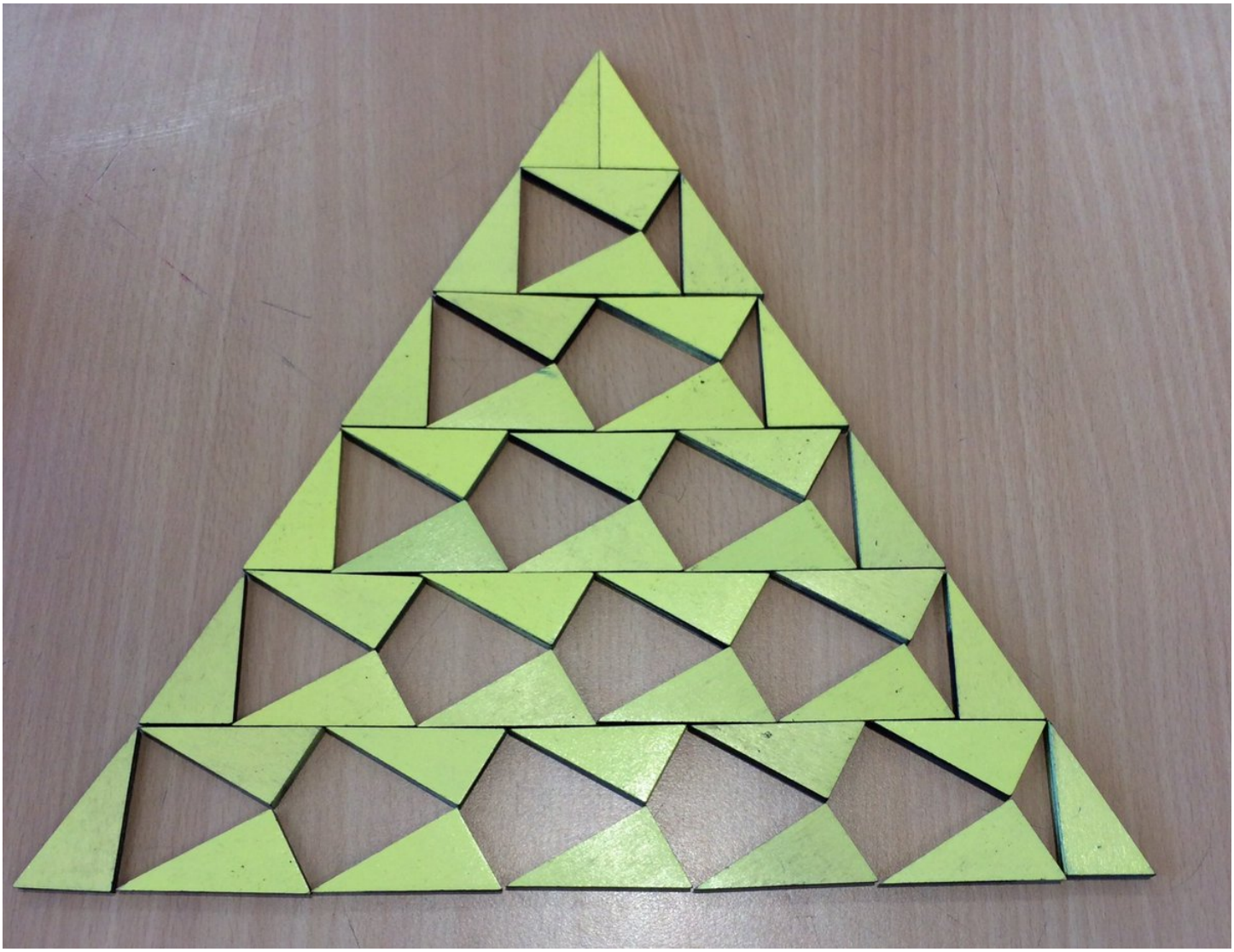


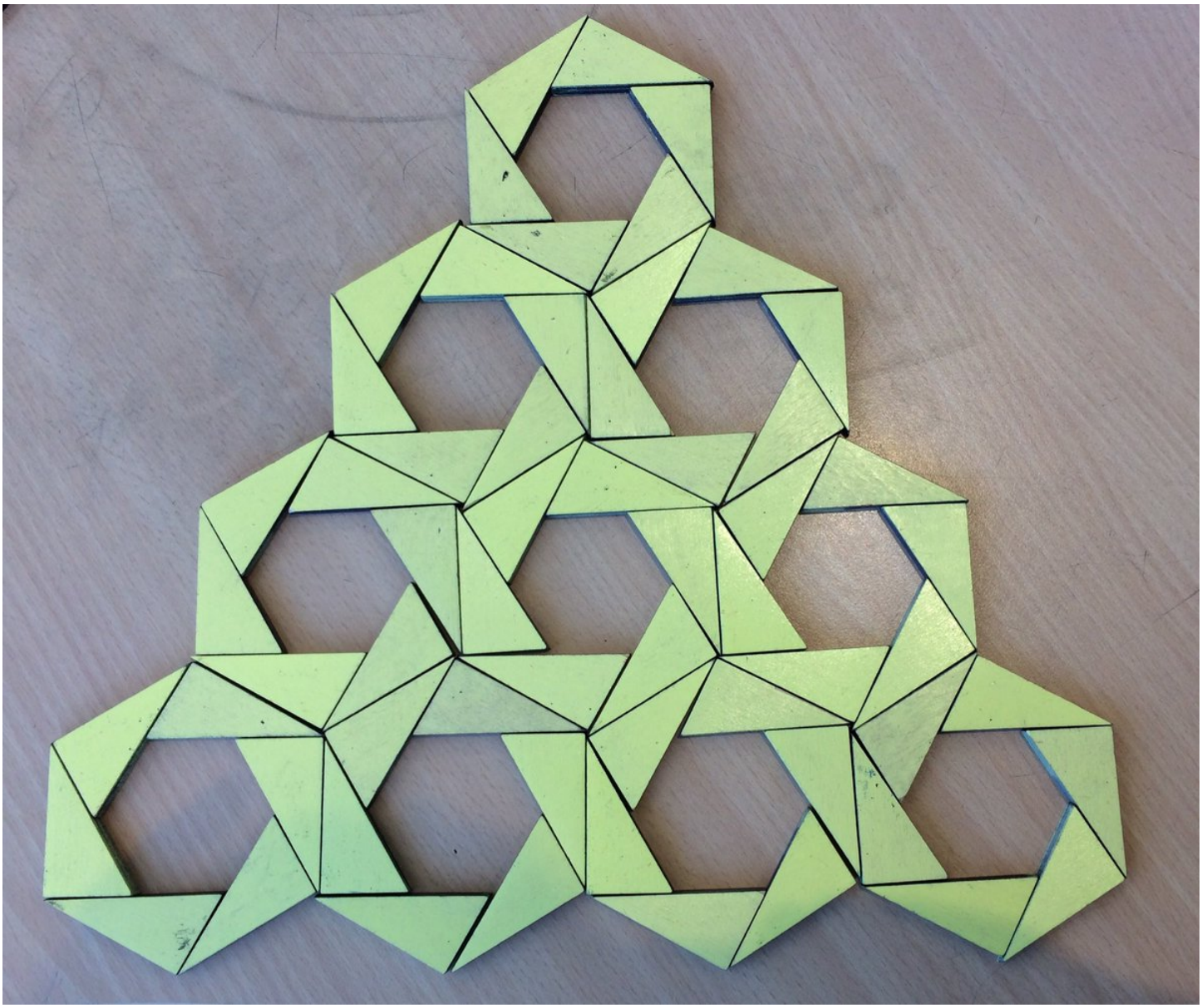




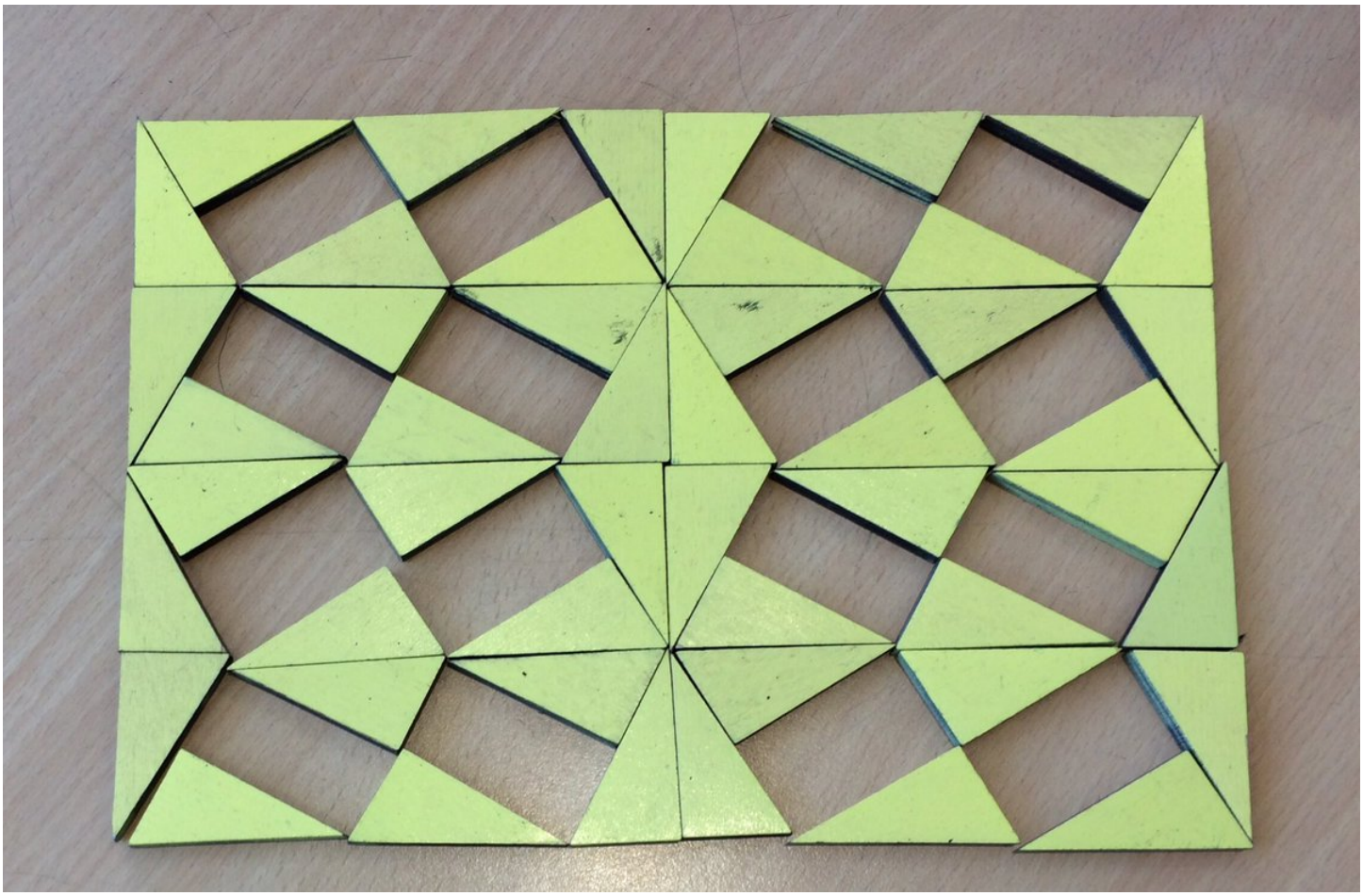








Thanks to Lee Dawson, @CDawson18 for this image.



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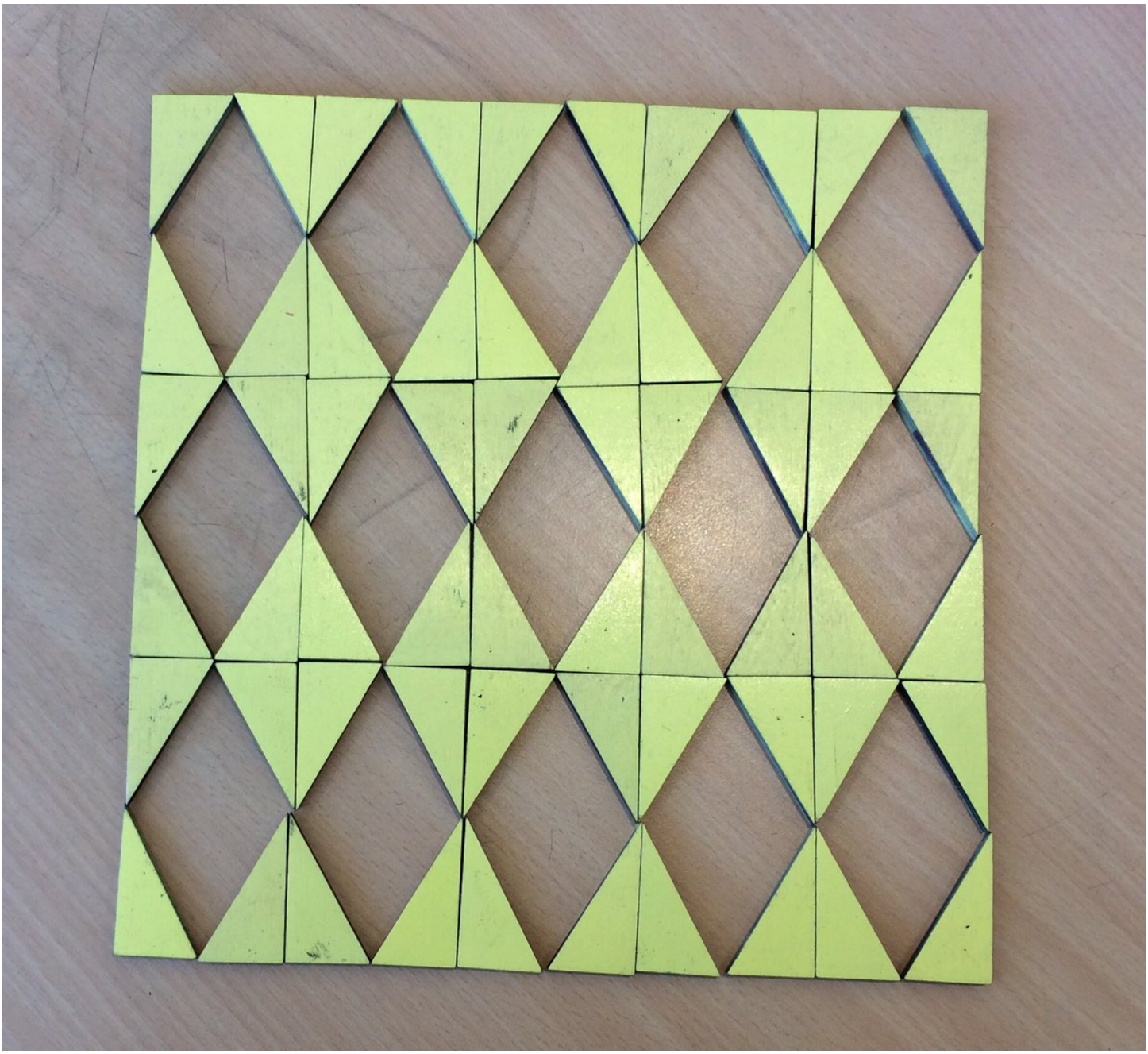

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