Pattern Block Triangles

Math concepts: Addition, counting, geometry
Equipment: Pattern blocks, scratch paper and pencil
Common Core: K.CC.4, K.CC.5, K.OA.1, K.OA.2, 1.OA.1, 1.OA.2, , 1.OA.4, 1.OA.5, 1.G.2, 2.OA.1, MP1, MP2, MP6, MP7, MP8

How many blocks you can use to build a triangle from pattern blocks?

Why We Love Pattern Block Triangles

This beautiful lesson combines student creative work, counting and addition practice, combining geometric shapes, and a slow build from easier to more challenging work.

The Launch

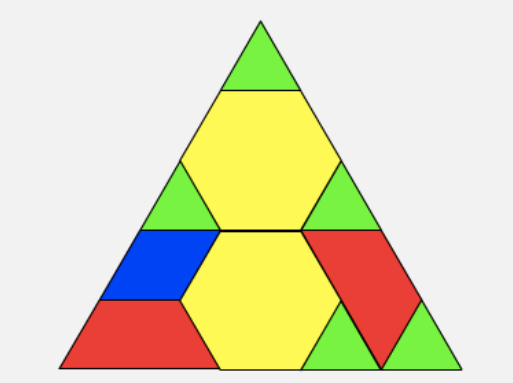
Prep the pattern blocks beforehand by removing the tan rhombuses and orange squares, or else tell students not to use those blocks.

Make sure every student has access to pattern blocks, and start with two warmup challenges: can students build a (filled in) triangle with pattern blocks using

1) Exactly 5 blocks?
2) Exactly 10 blocks?

Choose one student's work and show how to double-check the count by counting each type of block, and then adding those together, using an equation or a ten frame as necessary. For example, if you were using the triangle below as an example, you might write:

2 hexagons + 2 trapezoids + 1 rhombus + 5 triangles = 10 blocks



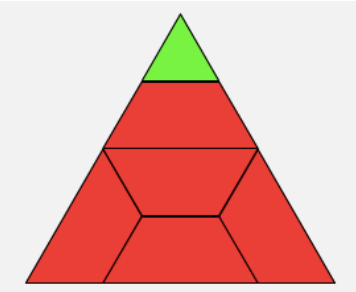
Or simply 2 + 2 + 1 + 5 = 10.

Once students are done with the warmups, pose a greater question: is it possible to build a triangle with whatever number of blocks you want? Can you build one with 2 blocks? With 3 blocks? 4 blocks? How far can you go?

Write a list of numbers from 1 to 20, and have students make their own list of numbers. Leave enough space so students can write an equation for each number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

If students can make a triangle using some number of blocks, they can write an equation for that number. For example, when they make a triangle using exactly 6 blocks, they can write an equation describing that triangle.
For the triangle to the right, for example, the equation might be 6 = 5 + 1.



The big challenge for students is: can they build a triangle for each number from 1 to 20? Or is there any number that they won't be able to build?

Students can work alone or with partners to build different triangles.

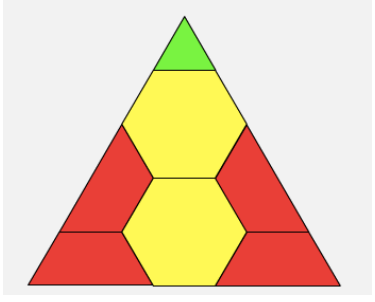
Prompts and Questions

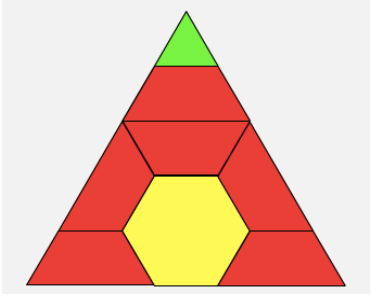
- How many blocks did you use in that triangle?
- Did you record it yet? Show me the equation for that triangle.
- Have you build a triangle with 11 blocks yet? How did you do it?

The Wrap

There is a powerful idea to underline as you wrap up this activity, which is that you can substitute smaller blocks—say, two trapezoids in the place of one hexagon—to raise the number of blocks you used in a triangle without changing anything else. Demonstrate this kind of substitution on a specific triangle, and then ask students if they can predict how making this substitution will change the number of blocks. For example:

2 hexagons + 4 trapezoids + 1 triangle = 7 blocks





1 hexagons + **6** trapezoids + 1 triangle = **8** blocks

Can students use this idea to make triangles using any of the missing numbers from their list?

Tips for the classroom

1. The idea in using the list is that every triangle is a success to start, and then certain holes in the list become more challenging to make.
2. There are two excellent ways to challenge students who successfully make all the triangles from 1 to 20. First, ask them if they can make a larger number, say, 31.
3. Second, challenge them to make a much larger triangle, and show you how they can correctly add all the pieces inside it.
4. For today, by "triangle" we mean triangles made out of pattern blocks with no empty spaces inside. Alternative definitions may pop up from students. Let them know that for today, we just mean triangles of this type.
5. For young students, you can just go from 1 to 10 instead of 1 to 20, and not require writing equations for each triangle.