Pattern Blocks Areas

Some questions about pattern blocks, and then some tougher ones.

1. Using only the orange square blocks, build 4 different sizes of squares. How many of the orange blocks does each larger square consist of?

2. Using only the green triangles, build 4 different sizes of triangles. How many of the little green triangles does each larger triangle consist of?

3. Using only the blue parallelograms, build 4 different sizes of parallelograms that have *the same shape as the original*. How many of the little blue parallelograms does each larger parallelogram consist of?

4. Using only the red trapezoids, build 4 larger trapezoids exactly the same shape as the small red pattern block trapezoid. How many of the little red trapezoids does each larger trapezoid consist of? How can you tell that you have a trapezoid the same shape as the original red one?

5. Can you build a larger scale model of the yellow hexagon using only hexagons? Why or why not?

6. Build three regular hexagons from pattern blocks. How does each one's area compare to the area of a single yellow hexagon?

7. What do the previous problems all have in common?

8. Now build some shape out of pattern blocks, and then build an exact scale model with every side twice as long as the original. How do their areas compare? Does this work for any shape?

Pattern Block Areas
Teacher's Notes

This is an activity designed for younger (4th-ish grade) kids, but middle and high schoolers will discover something interesting in it too. The overall goal is to discover how scaling works. In particular, if you build scale models of pattern blocks with sides that are *n* times as large, the resulting area is *n squared* times as large.

Some good questions to ask:

- Keep kids focused on building the next largest shape. Avoid building enormous shapes (though it can be fun to get decently big).
- Remind kids to count how many of the small shapes fit into their large shapes. For example, if they build a big parallelogram, remind them to count how many of the smaller parallelograms actually fit into it.
- The last question is a chance for them to really test their findings. Keep them precise on building a shape that is a true scaling of their original.

Selected hints, answers, and solutions

The solution to pretty much every problem here is the square numbers: 4, 9, 16, 25, etc. That's how many of any shape fit into a larger scale model (scaled by an integer).

For example, here's how 16 triangles build a triangle with sides four times as large as the original.