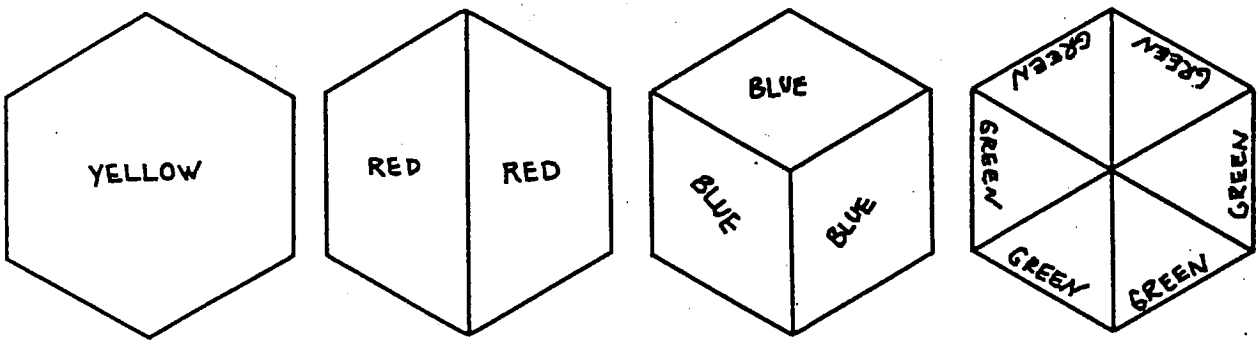
Two Green Triangles

As I was preparing my lessons after school one day, I remembered a pattern-block activity for teaching fraction concepts. The activity appealed to me because it used a manipulative that interested children, encouraged thinking, and set the stage for further instruction on equivalent fractions. It seemed like an appropriate choice for my fifth graders.

We had already spent several class periods identifying and writing fractions for parts of regions and sets, and all of the students were fairly successful. But I suspected that if I gave them the pattern-block task to complete independently or with a partner, it might overwhelm them. On the other hand, I thought if I approached it in a teacher-directed fashion and we moved slowly enough, they would be successful. It turned out I was wrong.

Since the students had been given ample opportunity to explore pattern blocks at the beginning of the school year, I began by describing the following task: "The yellow hexagon equals 1. Use the other color blocks to make exactly the same size and shape as yellow. Do this as many ways as you can." When some students began making hexagons from more than one color of block, I said I wanted them to use just one color. Several students discovered that the orange and white blocks would not fit into a hexagon, so I suggested they leave those blocks out.

These are the solutions they found:



I then displayed the following chart, using the overhead projector. I wrote 1s on the diagonal to show which block was the whole unit for that column. I wanted them to figure out the fractional relationships of the different colored blocks depending on which is considered the whole. My intention was to complete only one or two columns during that class period.

YELLOW	1			
RED		1		
BLUE			1	
GREEN				1

I asked the students which pattern block used the fewest blocks to cover a yellow. They responded, "Red." I asked them how many reds it took to make yellow and they answered, "Two." I told them we needed to write a fractional name for red. I reminded them that yellow was equal to 1 and that it took 2 reds to make yellow, so we would use 2 as our denominator. I wrote "$\frac{}{2}$" on the chart in the first column next to "red." Then I focused their attention on 1 red block and said, "If we have just 1 red block, then 1 is the numerator." I then completed the fraction "$\frac{1}{2}$" on the chart as illustrated below.

YELLOW	1			
RED	$\frac{1}{2}$	1		
BLUE			1	
GREEN				1

I pointed to the $\frac{1}{2}$ on the chart and asked how we say that fraction. They responded, "One-half." They appeared to be very comfortable with the concept of red as $\frac{1}{2}$ of yellow.

Then I held up a blue and asked students how many blues make a yellow. They responded 3, and I wrote "$\frac{}{3}$" in the chart next to "blue." Then, still holding up the blue block, I asked, "How many thirds is this?"

"One," they all agreed, and I wrote a 1 in the numerator to show "$\frac{1}{3}$". We continued the same painstaking process for the green block.

YELLOW	1			
RED	$\frac{1}{2}$	1		
BLUE	$\frac{1}{3}$		1	
GREEN	$\frac{1}{6}$			1

I felt confident that the students understood that the red was $\frac{1}{2}$ of the yellow, blue was $\frac{1}{3}$ of the yellow, and green was $\frac{1}{6}$ of the yellow. I decided to check their understanding a little further. I held up 2 green triangles and said, "If yellow equals 1 then how much is this?"

The boys and girls responded in unison, "Two."

"Two what?" I asked, hoping to hear "sixths."

They looked a bit confused and then one child said, "TWO GREEN TRIANGLES!" They all happily agreed.

I held up the 2 green triangles and said, "If these are less than yellow, it wouldn't make sense to call them 2. We need to write a fraction using a numerator and a denominator. How do we do that?" I could see by the expressions on their faces that they were really stumped. We went back to how many greens equal yellow and the fractional name for 1 green triangle. It seemed like the only way they could name or write the fractions was if I asked the questions and they filled in the blanks. Why?

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