Forty Faces

Topics: Addition, subtraction, skip counting, multiplication, logic **Materials**: Pattern Blocks, Scratch paper and pencil, Cuisenaire rods (optional) **Common Core**: 2.OA.1, 3.OA.3, 3.OA.8, 3.NBT.2, MP1, MP6, MP7

Why We Love Forty Faces

This delightful challenge provides an artistic exploration of ways to construct numbers by repeated addition or multiplication.

The Launch

Prepare the pattern blocks so they contain only green triangles, blue rhombuses, red trapezoids, and yellow hexagons. Ask students how many triangles it takes to build the blue rhombus (2), the red trapezoid (3), and the yellow hexagon (6). Then show them the faces below, either by building them or by projecting images of them.



Briefly discuss how these faces are made by putting together the equivalent of 10 or 20 triangles worth of area. For the second face, for example, there are 2 hexagons, 2 rhombuses, one trapezoid, and one triangle. In terms of triangle area, the total "value" would be 12 (in hexagons)+ 3 (in trapezoids) + 4 (in rhombuses) + 1 (in triangles) = 12 + 3 + 4 + 1 = 20 triangles worth of area.

Once students understand how to count the "value" of the face, challenge them to create their own faces from pattern blocks that have value (i.e., area) 10, 20, 30, or 40.

Prompts and Questions

- How much more area do you need to add to get to 30?
- Show me how you found the area.
- Let's count how much the hexagons are worth.
- The trapezoids came to 18 area? Let's write that down.
- Do you think the two of you could make a face with an area of 75?

The Wrap

Share a face that almost has area forty. Find its area/value with students, emphasizing the possibility of skip-counting or multiplying to find the value of specific blocks. Once everyone agrees on the area of the figure, take student suggestions for how it could be adjusted to come to forty exactly.

Tips for the Classroom

- 1. Remove the orange squares and tan rhombuses from the pattern blocks before the lesson begins.
- 2. Let students challenge themselves when they're ready. Can they make a "100 face"?
- 3. Encourage students to use pencil and paper to actually track the arithmetic. It gets difficult to find the answer without making a mistake once the faces get larger.
- 4. You can easily use Cuisenaire rods to make "forty faces" as well. Just use the white cube as the unit. Below is an example of a face with a value of **30**.

