Designing a Kitchen Backsplash

Common Core Standard

6.RP.3c Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent

The Task

The Marshall family is remodeling their kitchen. A creative way to incorporate color is by tiling the backsplash on the wall behind their stove. A standard backsplash is 18 inches by 2 feet. Their son Samuel is very artistic so they ask him to design a tile pattern for the backsplash.

The Marshalls only have a few guidelines they are asking Samuel to follow.

- They want to use small square tiles that are 1 inch by 1 inch. The available colors are red, yellow, green, and blue.
- Less than 15% of the backsplash should be yellow.
- For every 1 red tile they want 3 blue tiles.
- 140 square inches should be green.

Create a backsplash design for Samuel to present to his parents.

Facilitator Notes

1. Introduce the task to the students. Allow students a few minutes to read the task.
2. Consider showing students photographs of backsplashes to aid in their understanding and help them visualize what they are being asked to create. Some samples can be found at http://www.calfinder.com/blog/kitchen-remodel/hot-trends-in-kitchen-backsplashes/ or you can do an image search for “colorful stove backsplash patterns.”
3. Have students work in pairs to design a backsplash that adheres to the guidelines.
4. Circulate to monitor students’ work. Encourage students to determine the how many tiles of each color they will need before they focus on the design/arrangement of the tiles.
5. Provide students with color tiles and graph paper. Students may also want rulers, colored pencils, or other materials as they work.

Follow-Up Questions

1. What strategy did you use to determine the number of yellow tiles you need? Red? Blue? Green?
2. If Samuel’s parents decide to use larger tiles that are 2 inches by 2 inches, how will this impact the design of the backsplash? What if they decide to use small tiles that are ½ inch by ½ inch?
3. Samuel’s parents decided that they would like the backsplash to have a yellow border. Is it possible to accommodate their request?

Extension Activities

1. Once pairs have completed their designs, invite someone in (like an administrator) to choose their favorite design. The class could use color tiles to create the chosen design at actual size so they can see what their backsplash would look like, just like Samuel would get to see the results of his hard work.

Solutions

See Solutions #1-4 below.
Solution #1

18 inches x 2 feet = 18 in x 24 in = 432 in² = 432 tiles

Yellow → 1 less than 15%
15% of 432 = 0.15 x 432 = 64.8
≤ 64 yellow

Green
140 square inches = 140 in² = 140 green

Red/Blue → 1 red for every 3 blue

432 - 64 - 140 = 228 red or blue

1 red : 3 blue

\[ \frac{1}{4} \] red, \[ \frac{3}{4} \] blue

\[ \frac{1}{4} \] of 228 = 0.25 x 228 = 57 red

\[ \frac{3}{4} \] of 228 = 0.75 x 228 = 171 blue

64 + 140 + 57 + 171 = 432 total
Solution #2

\[18 \text{in} \times 24 \text{in} = 432 \text{in}^2\]
\[0.15 \times 432 \text{in}^2 = 64.8 \text{in}^2\]

Must have < 64 yellow tiles

\[432 \text{ total tiles}\]
\[- \frac{516}{376} \text{ yellow}\]
\[- \frac{140}{2310} \text{ green}\]
\[- \frac{2310}{59} \text{ red/blue}\]
\[3x + 1x = 2310 \rightarrow \frac{4x = 2310}{4}\]
\[x = 59 = \text{red}\]
\[3x = \text{blue} = 177 \text{ tiles}\]

\[516 \text{ yellow}\]
\[140 \text{ green} = 432 \text{ tiles}\]
\[59 \text{ red}\]
\[177 \text{ blue}\]
Solution #3

Yellow: 16 tiles
Red: 69 tiles
Blue: 207 tiles
Green: 140 tiles

1. 15% of 432 = 64.8, less than 64.8
2. 16 + 140 = 156
   432 - 156 = 276
   276 + 4 = 69
3. 40 sq in = 140 one inch by one inch tiles
Solution #4

Yellow: 32 tiles
Red: 65 tiles
Blue: 195 tiles
Green: 140 tiles

\[ 15\% \text{ of } 432 = 64.8, \quad \text{need less than 64.8} \]

\[ 32 + 140 = 172 \]
\[ 432 - 172 + 260 \]
\[ 260 - 4 = 65 \]

Red: Blue
1:3
65:195

140 sq in = 140 one inch by one inch tiles