Fraction Models with the Rubik’s Cube

Grade level: Elementary - Grade 4

National Mathematics Standards: Number and Operations Standard – Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

- Grades 3-5 Expectations: In grades 3-5 all students should -
  - Use models, benchmarks, and equivalent forms to judge the size of fractions
  - Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers
  - Recognize and generate equivalent forms of commonly used fractions, decimals, and percents

Objectives: Students will name the numerator and denominator of a given fraction, identify fractional values, and identify fractional parts using a Rubik’s Cube.

Materials: Rubik’s Cubes (1 per student)
          Math Notebooks
          Pencils
          Crayons or colored pencils (red, blue, yellow, green, orange)

Optional: Working With Fractions by David A. Adler

Background Knowledge: What is a fraction? Fractions are numbers representing objects that have been “broken” into parts. The term fraction is derived from a Latin word meaning “to break.” In fractions, the top number (numerator) counts the parts and the bottom number (denominator) tells what sized parts are being counted. Fractions can be expressed pictorially, written, and in symbolic form.

Procedure: Introduction
- Open the lesson with a review discussion about the definition of a fraction including the appropriate terminology (numerator, denominator, ratio, etc.) Write definitions and visual examples on the board.
- Next read the book Working With Fractions by David A. Adler aloud. (OPTIONAL)

Development
- After reading the book, hand out individual crayon packs/colored pencils.
- In math notebooks, students should title their entry, “Rubik’s Cube Fraction Investigation.”

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Next, model several fractions that can be found on a Rubik’s Cube by drawing several models on the board for students to see visually. As you model different fractions, instruct students to draw these models in their notebook, using their crayons. Each model should be labeled, noting each fractional value found on that face.

![Face #1]

3/9 or 1/3 of the squares is red (equivalent fraction)
1/9 are blue, 1/9 green, 2/9 yellow, 2/9 white

After modeling several different fractions, it is time for students to practice finding fractions for themselves. Remind students that it is important that they draw each face and the fractions found on that face in their math notebooks.

Once students have found the fractional values for each color, on each face, have them find fractions using more than one face. Students can find fractional values using all 6 faces combined (9x6=54). For example, how many red squares are there out of 54 squares? How many green squares? Each face should be drawn and the fractional values should be labeled accordingly.

Notes to Teacher: This lesson was developed by Tracy Zielke.

Thank you to Jennifer Zamora, 5th grade Math Teacher from Alvin, TX, for creating the following student page that is included with this lesson.
Objective: Students will name the numerator and denominator of a given fraction, identify fractional values, add fractions with common denominators, and identify fractional parts using a Rubik’s Cube.

- Draw the face of your Rubik’s cube on your notebook paper. Each model should be labeled, noting each fractional value found on the face.
- Identify the fractional value of the color tiles on one face.
- Add the two colors with the highest fractional value.
- Once you have found the sum of your fractions, make sure your fraction is in simplest form.