

Painted Cube Lesson

1) Initiation:

Give each pair of students a 5 x 5 x 5 cube made of linking cubes and ask the question: If this cube was dunked in a can of paint, how many of the cubes would have 0 faces? 1 face? 2 faces? 3 faces? 4 faces? 5 faces? 6 faces?

- Let the students work on this for about 5 minutes then pose the idea of starting with an “easier” example and working up to more challenging examples

2) Hand out the student worksheet and discuss the first two questions:

Each unit cube has six sides. Why aren't “**Number of unit cubes with exactly four/five/six faces painted**” columns in our chart?

How do you figure out the number of unit cubes in a cube?

3) Allow students to work in pairs to complete the worksheet:

At the check point ask how they are “**counting the number of cubes with one face painted? Two faces? Three faces?**”

Makes sure they are using the geometry to explain it and not just counting

4) Give each student POSTER PAPER and have them draw a picture of a 5 x 5 x 5 cube and ask them to use markers to explain how they “counted” the number of cubes with 0, one, two, and three faces painted.

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Comment:

• Students will be able to articulate the difference between a unit cube and a cube.

• Students will be able to explain why some cubes will be painted and others wont

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Comment:

• Students will be able to explain how calculating *volume* is the same as finding the number of unit cubes in the cube

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Comment:

• Students will be able to create an expression for each column in the chart that will allow them to calculate the number of cubes with 0, 1, 2, 3 faces painted for any size cube

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Comment:

• Students will be able to explain how they found the number of cubes with 0, 1, 2, or 3 faces painted for each size cube

• Students will be able to understand how the expressions relate to the geometry of the cube

Painted Cube Problem

Essential Question:

- How can we use geometry to help us understand and form algebraic expressions?

Content objectives:

- Students will be able to explain why some cubes will be painted and others wont
- Students will be able to create an expression for each column in the chart that will allow them to calculate the number of cubes with 0, 1, 2, 3 faces painted for any size cube
- Students will be able to understand how the expressions relate to the geometry of the cube

Language objectives:

- Students will be able to articulate the difference between a unit cube and a cube.
- Students will be able to explain how calculating *volume* is the same as finding the number of unit cubes in the cube
- Students will be able to explain how they found the number of cubes with 0, 1, 2, or 3 faces painted for each size cube

Materials:

- Unit cubes: *linking cubes*
- Student worksheets
- Poster paper (to display their geometrical thinking behind their algebraic expressions)
- Markers