When Arguing is Good Thing: The Case of Fractions

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Analyze this…

1 5/6 ÷ 1/3

a)6/33 b) 11/18

c) 5 1/6 d) 5 1/2

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Use errors as springboards to learning

When students are taught through the Standards for Mathematical Practice of the Common Core there is a fundamental shift in what students know and can do – even their errors are affected. We must be prepared.

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Goals for this session

- Experience cognitive dissonance using appropriate tasks and plan for their use in classroom instruction.
- Unpack norms supportive of creating environments for rich class discussions.
- Make connections to Mathematical Practices.

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What classroom norms promote "arguing?"

- Provide explanations and justifications with all answers.
- Make sense of each other's solutions.
- Say when you don't understand or don't agree.

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Consider this.

How might grade 6 students taught according to the Common Core solve a problem like this?

$$2\ \tfrac{1}{2} \div \tfrac{1}{4}$$

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Developing Fraction Operations

- **Grade 5**
  - Add/subtract fractions with unlike denominators with and without context using visual models or equations.
  - Solve word problems involving division of whole numbers leading to answers in the form of fractions.
  - Multiply whole numbers or fractions by fractions with and without context using visual models or equations.
  - Multiply fractional side lengths of rectangular regions to find the area.

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Developing Fraction Operations (continued)

- **Grade 5**
  - Interpret division of a unit fraction by a non-zero whole number or division of a whole number by a unit fraction and create contexts and use visual models or equations to solve.
- **Grade 6**
  - Divide fractions by fractions with and without context and use visual models or equations to solve.

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Write an equation to represent each problem then use a visual model to solve it.

1. There is 2/3 of a pizza left over. Jessica ate 3/4 of the leftover pizza. How much of a whole pizza did Jessica eat?
2. Alex brought 3/4 of a pan of brownies to school. Her friends ate 2/3 of what she brought. How much of the pan of brownies did her friends eat?
3. The park measured 2/3 of a mile by 3/4 of a mile, what fraction of a square mile is the park?

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With which practice were we engaged?

The 8 Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

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Creating Worthwhile Tasks

Consider this…

A student is asked to share 4 cookies equally among 5 friends. How much of a cookie should each friend get?

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Creating Worthwhile Tasks

Consider this…

A student is asked to share 4 cookies equally among 5 friends. How much of a cookie should each friend get? – Give each person the biggest unbroken piece of cookie possible to start.

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With which practices were we engaged?

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Students are expected to create contexts for operations with fractions. What does this look like and how might it involve "arguing?"

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Create a story problem for the following:

Create a story context for 4/5 - 1/2.

Begin like this:

"Ed has 4/5 of a pizza leftover…."

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