



Santee

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Resources

- Youcubed.org
- <http://tinyurl.com/k5wqwgn>
- <https://sites.google.com/site/cathysmathplace/welcome>

My Favorite Classroom Game



- Multiplication fact practice
- Strategy
- Inverse operations

Tic-Tac-Toe Products 2

81	16	63	12	45	8	27	4
32	63	24	49	16	35	8	21
72	24	18	40	12	24	6	56
40	54	30	42	20	30	10	18
45	48	35	36	25	24	15	12
64	27	48	21	32	15	16	9
36	56	28	42	20	28	12	14
72	18	54	14	36	10	18	6

1 2 3 4 5 6 7 8 9

Web's Depth of Knowledge

- Recall and Reproduction
- Skills and Concepts
- Strategic Thinking
- Extended Thinking

The Chinese Remainder Theorem

An old woman goes to market and a horse steps on her basket and crushes the eggs. The rider offers to pay for the damages and asks her how many eggs she had brought. She does not remember the exact number, but when she had taken them out two at a time, there was one egg left. The same happened when she picked them out three, four, five, and six at a time, but when she took them seven at a time they came out even. What is the smallest number of eggs she could have had?

Oystein Ore mentions a puzzle with a dramatic element from Brahma-Sphuta-Siddhanta (Brahma's Correct System) by Brahmagupta (born 598 AD) <http://www-math.ucdenver.edu/~wcherowi/courses/m5410/crt.pdf>

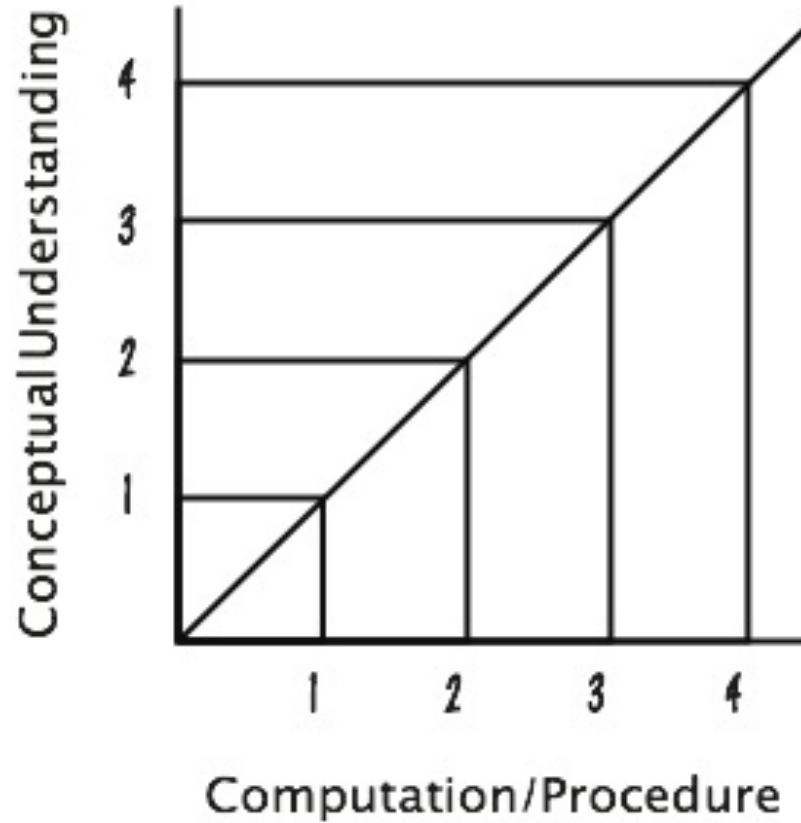
Low Floor High Ceiling Tasks

- Everyone can get started
- Multiple ways to engage
 - Visually, patterns, manipulatives, charts...
- Math learning is embedded
- Task is open, students can go beyond the expected learning

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Balance & Math Fluency



Fractions Galore...

- Part Whole Comparison
- Measurement
- Operator
- Quotient
- Ratio

Students who studied ratios and rates as their primary focus had no trouble switching between ratio and part-hole comparisons and no trouble with addition and subtraction

Susan Lamon. Teaching Fractions and Ratios for Understanding

Number Strings

Context Helps!

FIGURE 8.1

Fractions Are Quotients

$$\$5 \div 10$$

$$\$2 \div 10$$

$$\$4 \div 10$$

$$\$1 \div 10$$

$$\$6 \div 10$$

$$\$8 \div 10$$

$$\$3 \div 10$$

$$\$10 \div 5$$

$$\$5 \div 5$$

$$\$2 \div 5$$

$$\$4 \div 5$$

$$\$1 \div 5$$

$$\$3 \div 5$$

$$\$0.50 \div 5$$

$$\$3 \div 5$$

$$\$6 \div 5$$

$$\$6 \div 10$$

$$\$2 \div 3$$

$$\$2 \div 6$$

$$\$6 \div 9$$

$$\$3 \div 4$$

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Group Roles

- Recorder/Reporter
- Supply Manager
- Director
- Spy

Oatmeal Problem

In the bag you have $\frac{2}{3}$ of a cup of oatmeal. You are allowed to eat $\frac{3}{4}$ of the oatmeal in the bag. How much will you cook?

1. What fraction represents the amount you will cook?
2. How can you justify your answer using what you know about fraction operations

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Critical Thinking & Communication

- Convince yourself
- Convince a fiend
- Convince a skeptic

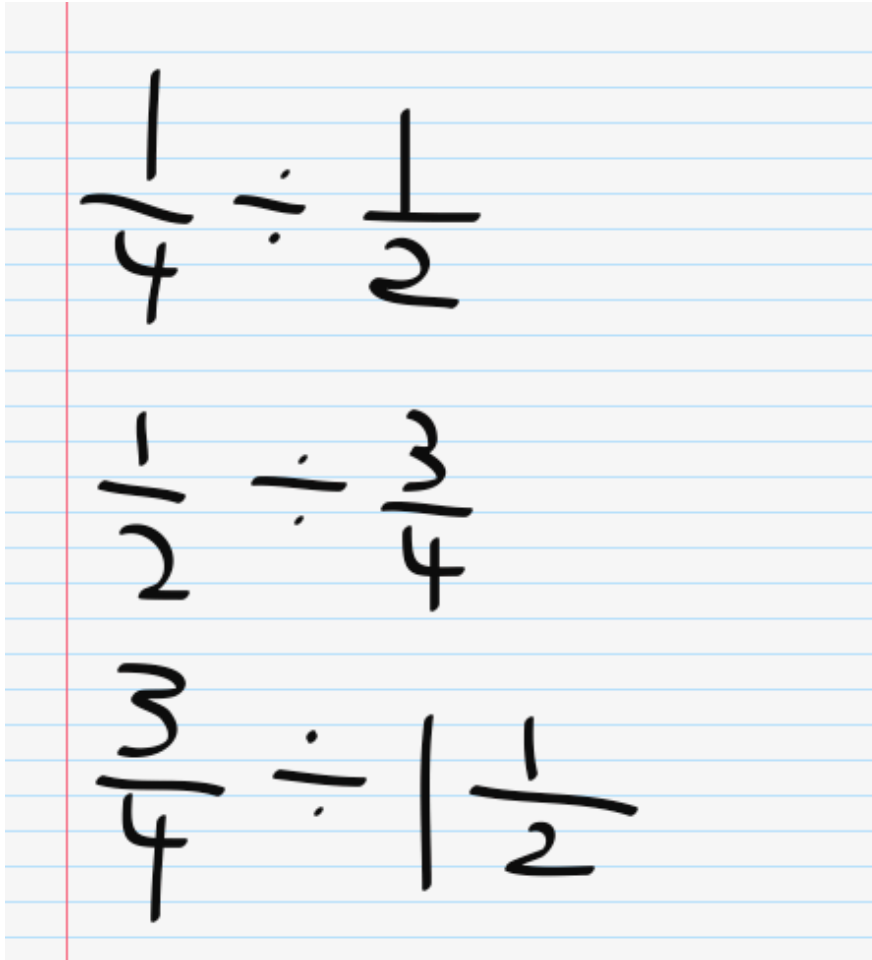
Let's Integrate

Context
Helps!

For each part of the problem, start with a square sheet of paper and make folds to construct a new shape. Then, explain how you know the shape you constructed has the specified area.

1. Construct a square with exactly $\frac{1}{4}$ the area of the original square. Convince yourself that it is a square and has $\frac{1}{4}$ of the area.
2. Construct a triangle with exactly $\frac{1}{4}$ the area of the original square. Convince yourself that it has $\frac{1}{4}$ of the area.
3. Construct another triangle, also with $\frac{1}{4}$ the area, that is not congruent to the first one you constructed. Convince yourself that it has $\frac{1}{4}$ of the area.
4. Construct a square with exactly $\frac{1}{2}$ the area of the original square. Convince yourself that it is a square and has $\frac{1}{2}$ of the area.
5. Construct another square, also with $\frac{1}{2}$ the area, that is oriented differently from the one you constructed in 4. Convince yourself that it has $\frac{1}{2}$ of the area.

Fraction Division



- Groups of 3
- Look at each problem in sequence
- Answer and justify through a picture
- Each of you convince your friend and skeptic of the answer through your picture. Make sure you each play the role of the skeptic

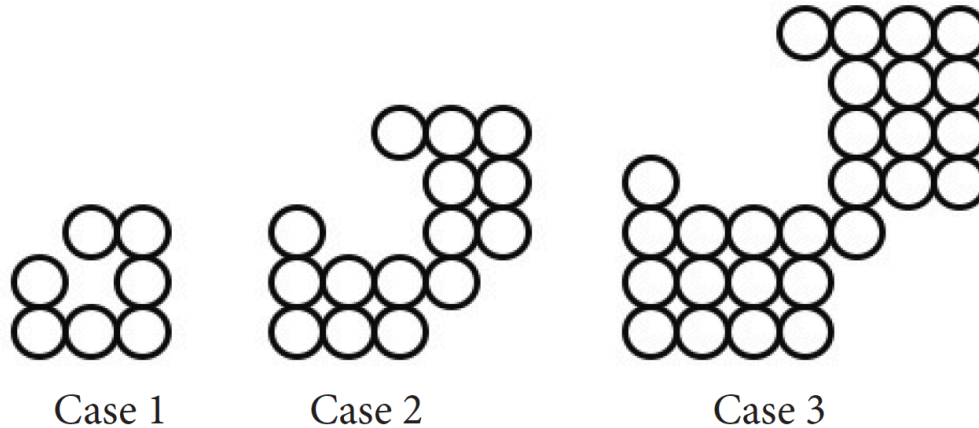
Participation Quiz

Change the
culture of
math class!

- Leaning In
- Equal Air Time
- Staying Together
- Asking Good Questions
- Clear Diagrams and Explanations
- Stick to your roles

Algebra Through Patterns

Circle Fever



1. How do you see the pattern growing?
2. What would the 10th case look like?
3. How many circles would be in the 100th case?
4. How many circles would be in the -1 case?
5. Can you model the pattern with an expression?

A Different Look at Algebra

$$2(x+1) + 3(x+1) = 10$$

$$2(x+1) + 3(x+1) = 11$$

$$2(x+1) + 3(x+2) = 10$$

Big Ideas

“Big Ideas, which are overarching concepts that connect multiple concepts, procedures, or problems within or even across domains or topics (Baroody, Cibulskis, Lai & Li, 2004), are integral to achieving a deep understanding of both concepts and procedures.” (Baroody, Feil & Johnson, 2007)

Flexibility

“MERs widely agree that “flexibility of approach is the major cognitive requirement for solving nonroutine problems” that procedural fluency should entail flexible (as well as efficient and appropriate) application of procedures, and that each of these critical components of mathematical proficiency both benefits from and benefits conceptual understanding”

(Baroody, Feil & Johnson, 2007)