Number Talks:

Fractions, Decimals, and Percentages

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Fluency with Fractional Reasoning

Critical foundation for determining success in higher mathematics

Siegler, et al, 2012

National Math Panel, 2008

Student Misconceptions

.05 + .28 + 9 + 1.33	Which is larger? .5 or .105
2 ½ - 7/8	2/7 – 1/5
3/4 ÷1/2	3/5 + 3/4

Standards for Mathematical Practices

- Make sense of problems and persevere
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for an express regularity in repeated reasoning

Number Talks

A five to fifteen minute classroom conversation around purposefully crafted problems that are solved mentally

Computation Goals

Accuracy

Flexibility

Efficiency

Principles of Number Talks

- Logico-Mathematical Knowledge
- Safe Learning Community
- Purposeful Problems
- Purposeful Recording

3 Types of Knowledge

- Social
- Physical
- Logico-Mathematical

Social Knowledge

V

5

X

●

a (b)

Physical Knowledge

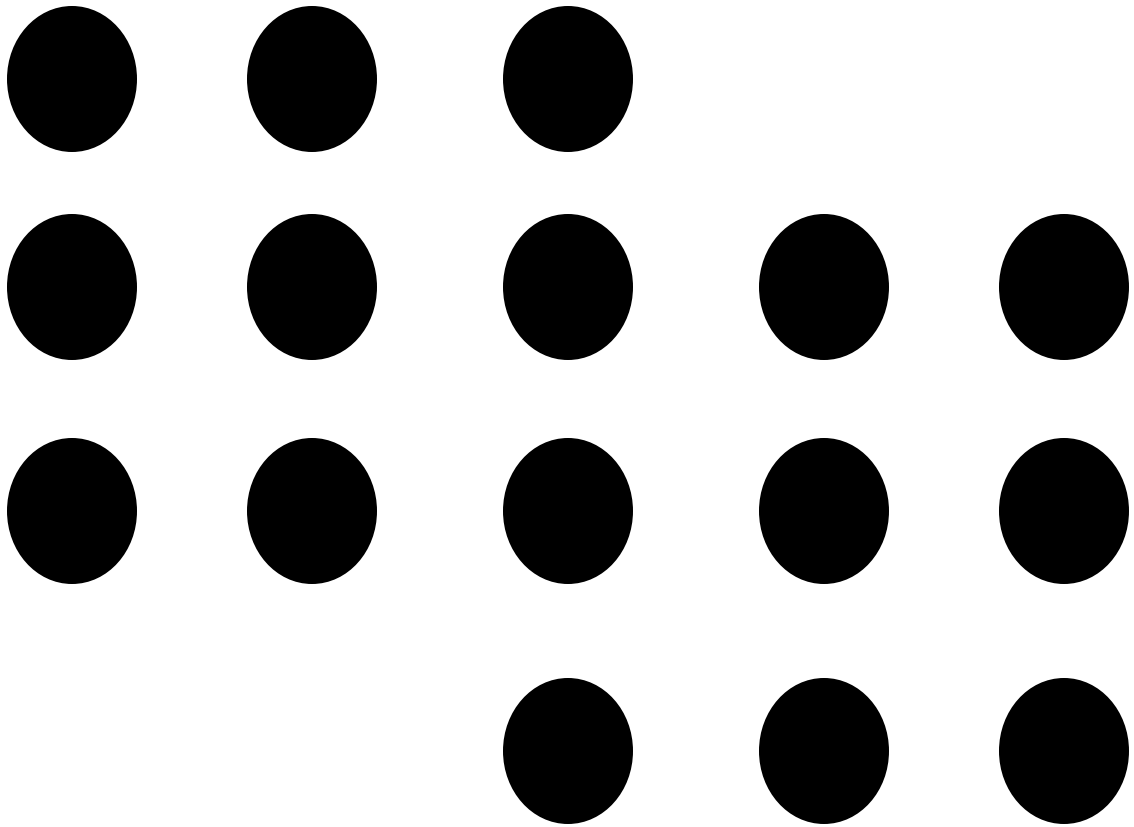
Science

Logico-Mathematical Knowledge

Mental Relationships

How many do you see?

How do you see it?



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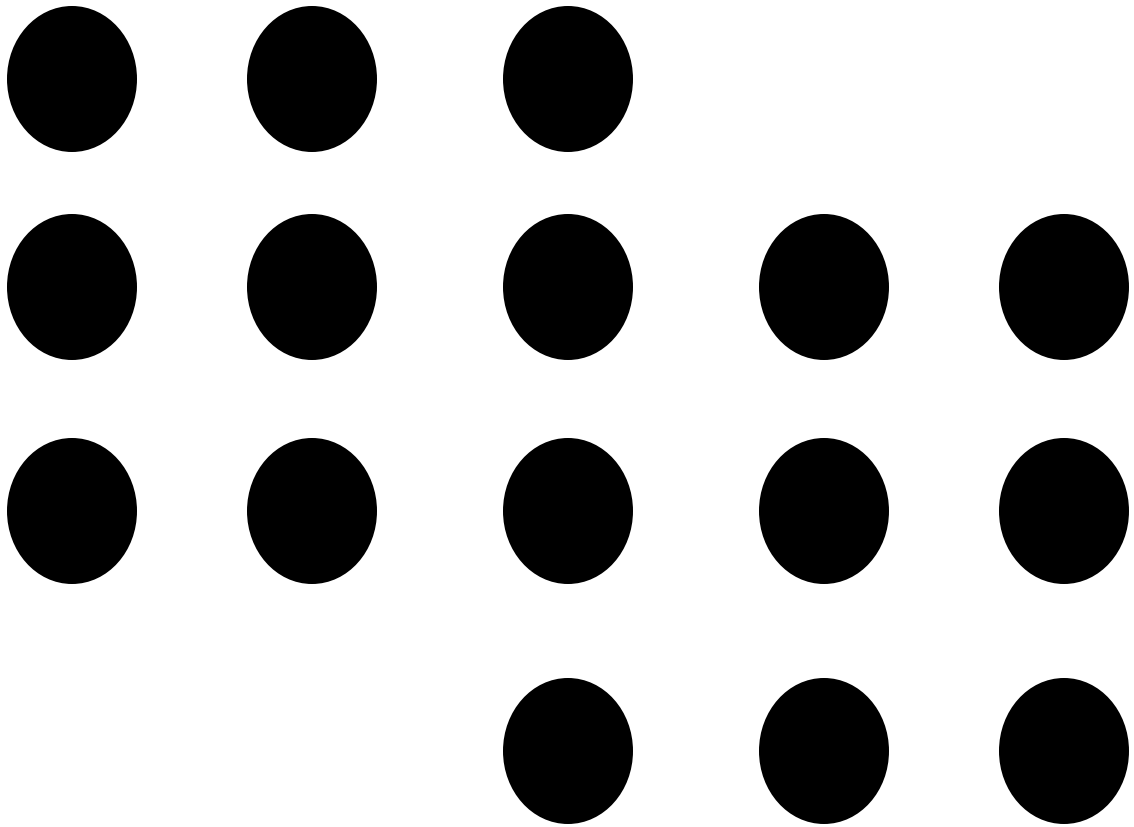

Key to Number Talks

Use accurate language to support mental relationships

1.5 x 2.4

- Think about how you would solve this problem.
- Share your strategy while your partner records your thinking.

Purposeful Recording for 1.5 x 2.4

$$1.5 \times 2.4$$

$$= (1 + .5) \times 2.4$$

$$= (1 \times 2.4) + (.5 \times 2.4)$$

$$= 2.4 + 1.2$$

$$= 3.6$$

Distributive Property

Purposeful Recording for 1.5 x 2.4

$$1.5 \times 2.4$$

$$= (1.5 \times 2) \times (2.4 \times 1/2)$$

$$= 3 \times 1.2$$

$$= 3.6$$

Identity Property

Purposeful Recording for 1.5 x 2.4

$$1.5 \times 2.4$$

$$= 1.5 \times (2 \times 1.2)$$

$$= (1.5 \times 2) \times 1.2$$

$$= 3 \times 1.2$$

$$= 3.6$$

Associative Property

Principles to Actions

Understanding before Procedures

(NCTM, 2014)

Strategies

Algorithms

Standard Algorithms

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6th Grade Number Talk String

1 ÷ 1/3

2 ÷ 1/3

2 ÷ 2/3

Think About. . .

- How does the teacher create a safe learning community?
- How does the Number Talk string support student reasoning?
- Which student strategies surprised you?
- What problem would you pose next? Why?

Investigating Student Strategies

$1 \div 1/3$

$2 \div 1/3$

$2 \div 2/3$

$5 \div 2/3$

Developing flexibility among fractions, decimals, and percentages

.75 + 1 3/8

- Think about how you would solve this problem.
- Share your strategy while your partner records your thinking.

.75 + 1 3/8

.75 + 1 3/8

= .75 + (1 + 1/4 + 1/8)

= (.75 + 1/4) + 1 + 1/8

= 1 + 1 + 1/8

= 2 1/8

.75 + 1 3/8

.75 + 1 3/8

(.75 + .25) + 1 3/8

1 + 1 3/8

2 3/8 – 1/4

= 2 1/8

5th Grade Multiplication String

1/2 x 1/3

1/4 x 1/3

1/4 x 2/3

Student Responses for 1/4 x 1/3

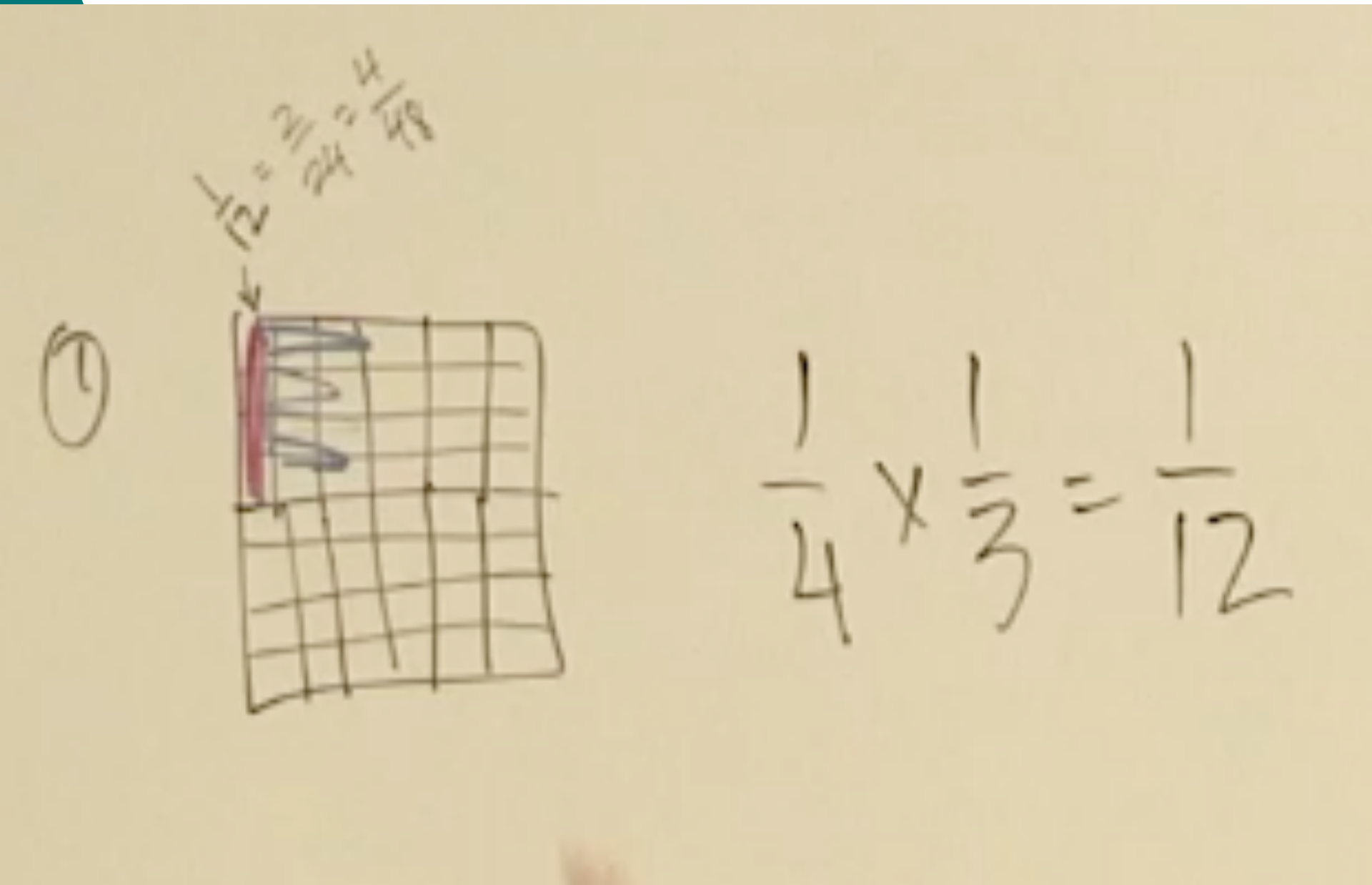
1/12

4/48

2/24

8 1/3 %

Using an Area Model to Justify

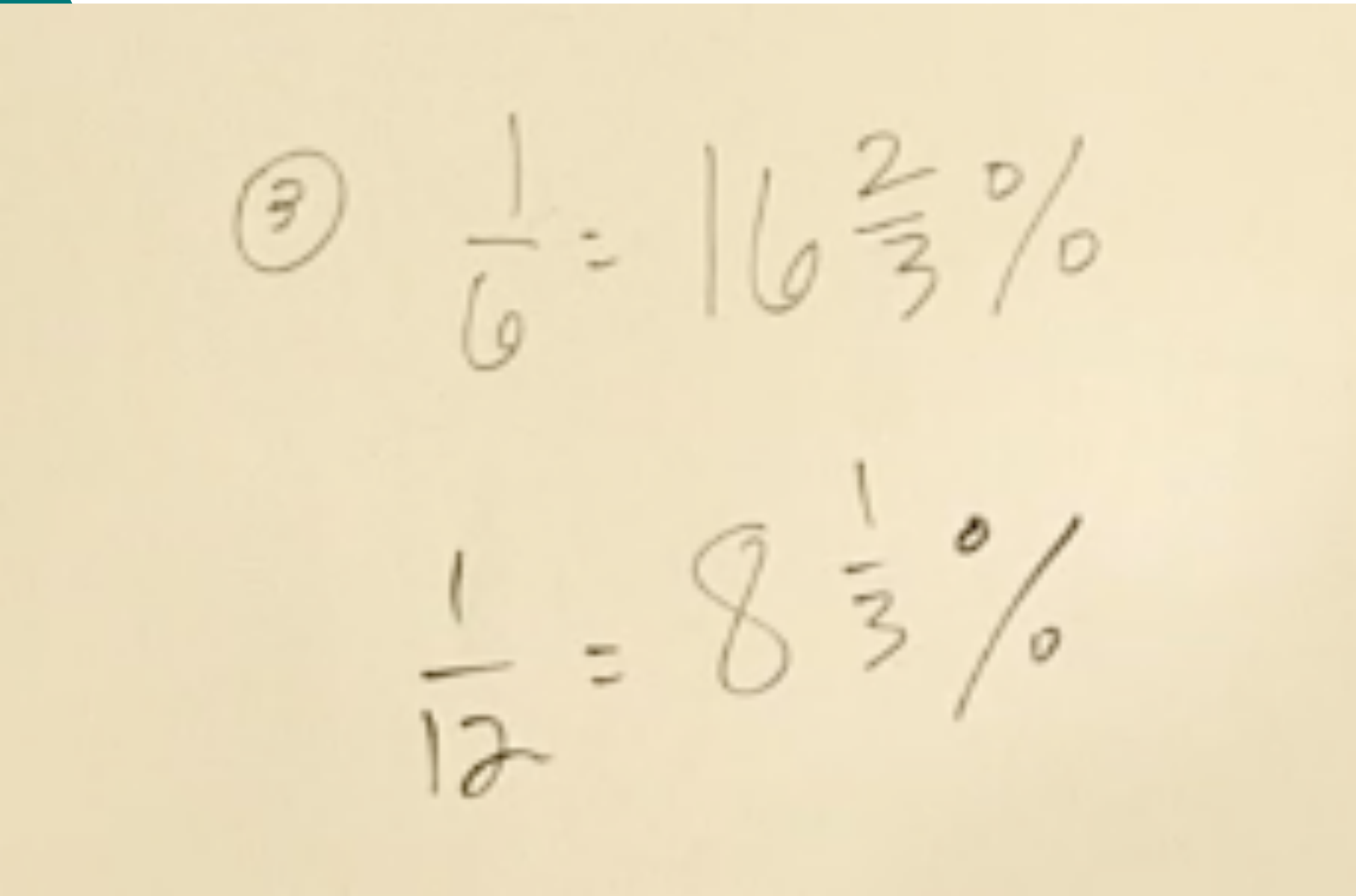


Using the Identity Property to Justify 2/24

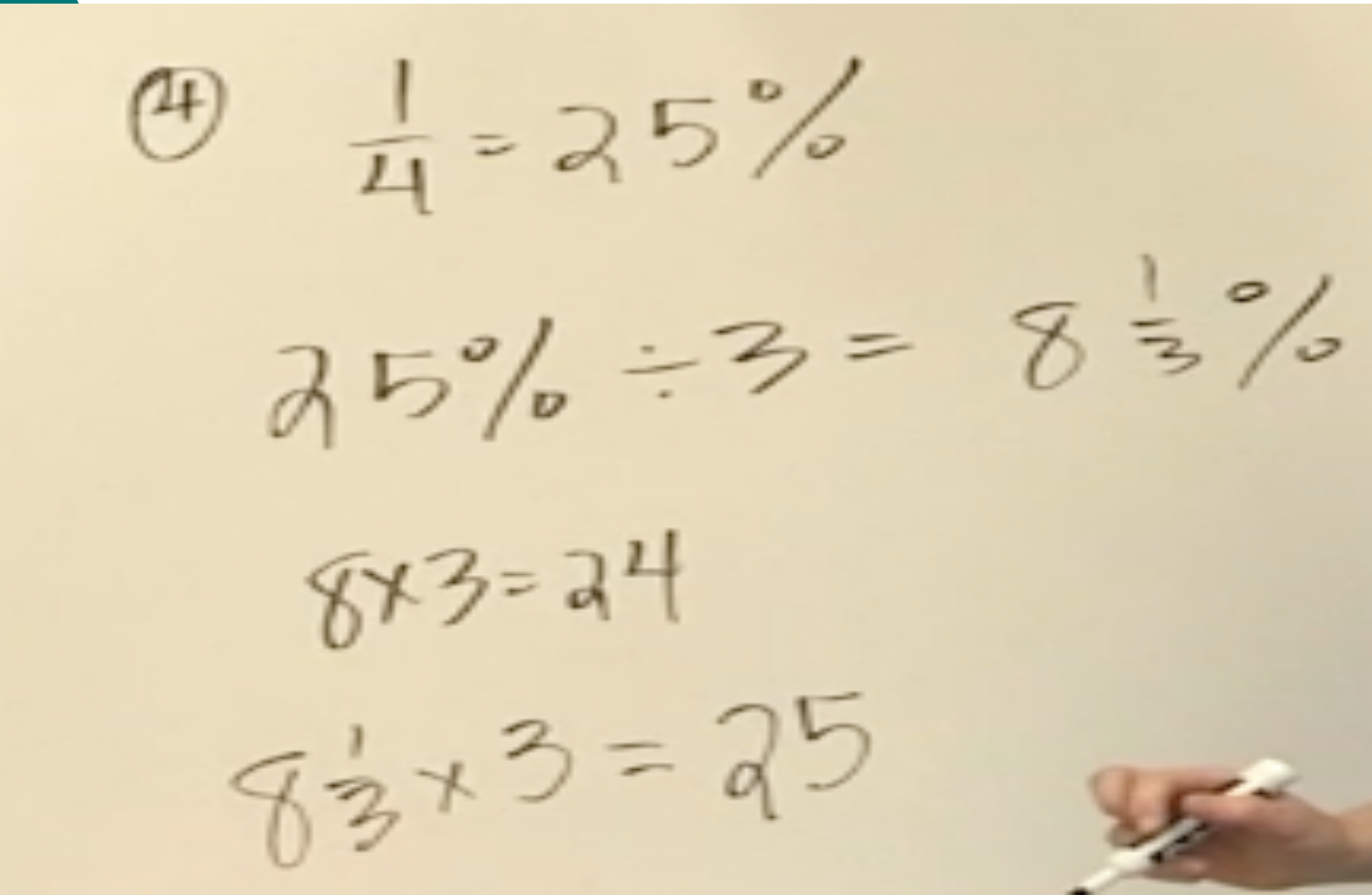
(2) $\frac{1}{12} \times \frac{2}{2} = \frac{2}{24}$

$\frac{2}{2} = 1$

Using a Previous Problem, 1/2 x 1/3



Using Percents and Reciprocals



Think About. . .

- What evidence supports the student's flexibility in thinking?
- When does the teacher ask and when does she tell?

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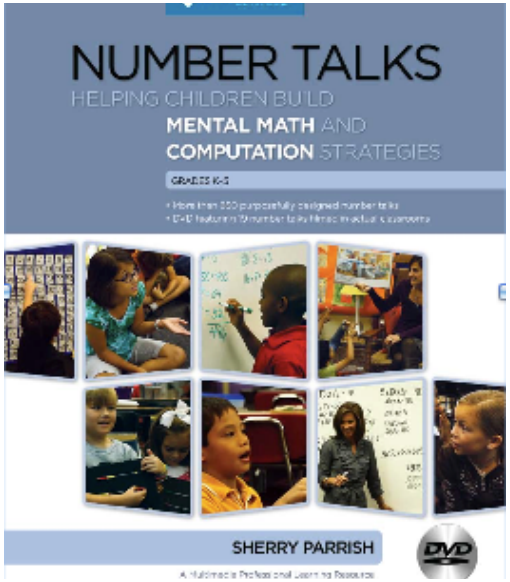
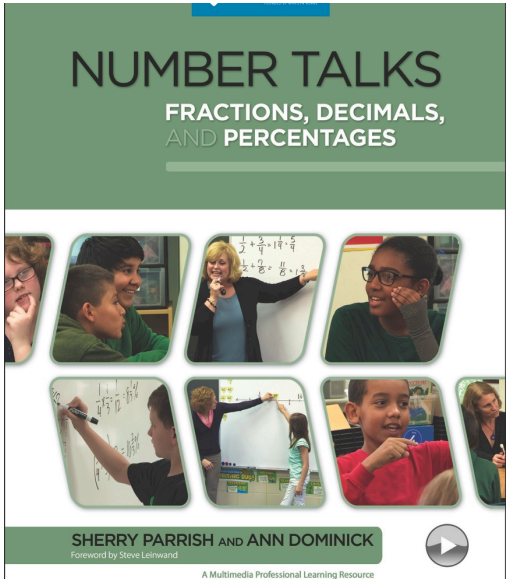
When you teach a child something you take away forever his chance of discovering it for himself.

Piaget





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