SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

NCTM 2015 MIDDLE SCHOOL NUMBER TALKS

Welcome Middle School Educators!

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

What is a Number Talk?

Number Talks are a valuable classroom *routine* for:

- making sense of mathematics
- developing efficient computation strategies
- communicating reasoning
- and proving solutions

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Common Core Standards for Mathematical Content

The Number System, 6-8: Overview

In Grades 6–8, students build on two important conceptions which have developed throughout K–5, in order to understand the rational numbers as a number system.

The first is the representation of whole numbers and fractions as points on the number line,

and the second is a firm understanding of the properties of operations on whole numbers and fractions.

— Progressions for the Common Core State Standards in Mathematics, Number Sense, 6-8, www.commoncoretools.wordpress.com

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Why "Middle School" Number Talks?

Examining Common Errors:

1. $\frac{3}{4} - \frac{1}{2}$
2. 5.40 × 0.15
3. -3 + -6
4. (x + 2)(x + 3)
5. A 150 mile trip took 5 hours. How far can I travel in 9 hours?

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Session Goals

In this session we will:

- Use models and tools that support student understandings and proficiencies called for in the Common Core State Standards
- Recognize and support students' understandings of the mathematical properties
- Share strategies in ways that emphasize the important mathematical ideas that are inherent in the strategies

Four Procedures and Expectations

1. Establish Number Talks as part of your math class routine.
2. Provide appropriate wait time for most students to access the problem.
3. Accept, respect, and consider all answers.
4. Encourage student communication.

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talks as a Vehicle for Computation Strategies

- Efficiency
  - the ability to choose an appropriate, expedient strategy
- Flexibility
  - the ability to use number relationships with ease in computation
- Accuracy
  - the ability to produce an accurate answer

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Key Components of Number Talks

- Classroom environment and community
- Classroom discussions
- The teacher's role
- The role of mental math
- Purposeful computation problems

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk:
Compute the Answer Mentally

$$16 \times 35 =$$

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk Student Responses

16 × 35

Sarah Grace

16 ×35 =
20 ×35 = 700
35 × 4 = 140
700-140= 560
(friendly number)

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk Student Responses

16 × 35

Molly

16 ×35 =
8 ×70 = 560
(doubling/halving)

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk Student Responses

16 × 35

Jarvis

16 × 35 =
8 × 2 7 × 5
4 ×2 ×2 × 7 × 5
2×2×2×2 × 7 ×5 =
560
(prime factorization)

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk Student Responses

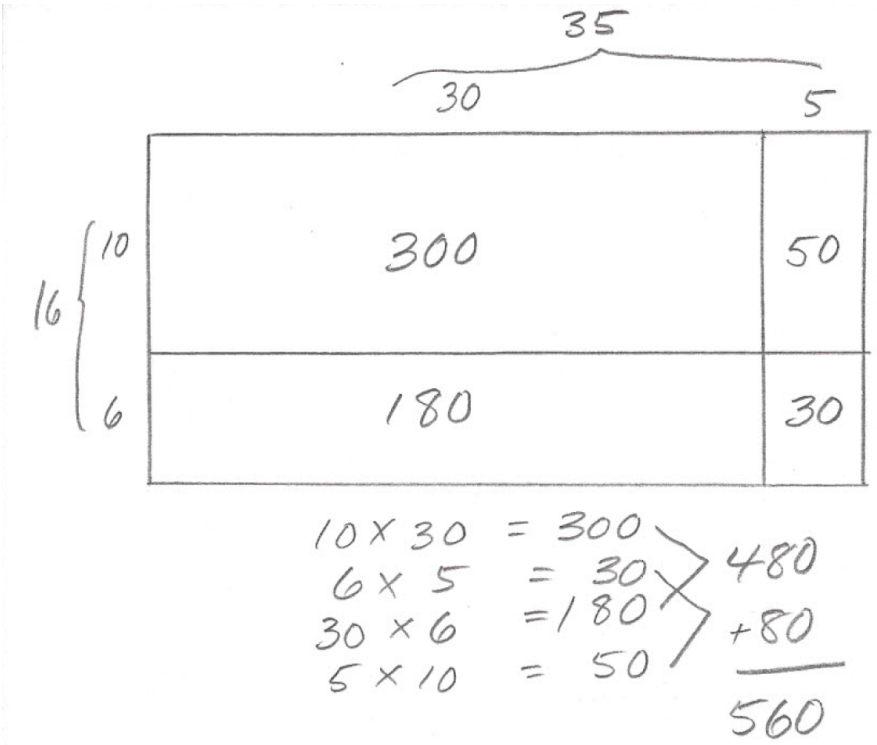
16 × 35

Omar

16 ×35 =
10 x 30 = 300
6 x 5 = 30
30 x 6 = 180
5 x 10 = 50
300 + 180 + 30 + 50=
480 + 80 = 560
(partial products)

16 × 35 Area Model

Omar
16 ×35 =
10 x 30 = 300
6 x 5 = 30
30 x 6 = 180
5 x 10 = 50
300 + 180 + 30 + 50=
480 + 80 = 560
(partial products)



16 × 35 = (10 + 6) × (30 + 5)
= (10 × 30) + (6 × 5) + (30 × 6) + (5 × 10) = 560

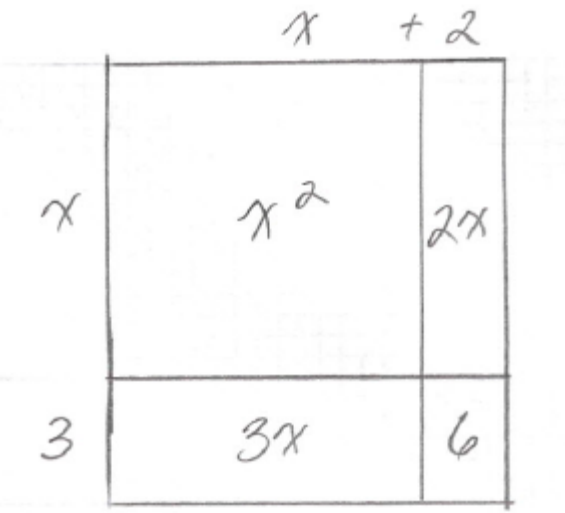
SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talks In Response to Common Errors

1. $\frac{3}{4} - \frac{1}{2}$
2. 5.40 × 0.15
3. -3 + -6
4. (x + 2)(x + 3)
5. A 150 mile trip took 5 hours. How far can I travel in 9 hours?

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Using Partial Products Model to Solve (x + 2)(x + 3)



$x^2 + 2x + 3x + 6$

$= x^2 + 5x + 6$

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talk:
Compute the answer mentally

1. $(x + 3)(x + 5)$

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talks In Response to Common Errors

1. $\frac{3}{4} - \frac{1}{2}$
2. 5.40 × 0.15
3. -3 + -6
4. (x + 2)(x + 3)
5. A 150 mile trip took 5 hours. How far can I travel in 9 hours?

Strategies for Fraction Addition

$3/4 + 3/4$ From *Beyond Invert and Multiply* by Julie McNamara "Coming Soon"

$= 1/2 + 1/4 + 1/2 + 1/4$ Decomposition of Fractions

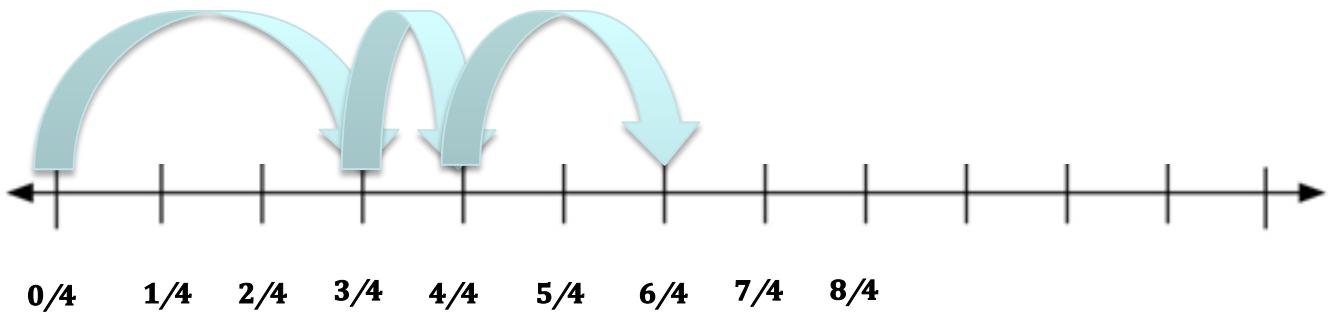
$= 1/2 + 1/2 + 1/4 + 1/4$ Commutative Property

$= 1 + 2/4 = 1\,1/2$ Associative Property Recomposition

Model for Fraction Addition

$$\frac{3}{4} + \frac{3}{4} =$$

$$\frac{3}{4} + \frac{1}{4} + \frac{1}{2} = 1\frac{1}{2}$$



0 1 1 1/2

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talks: Fraction Addition

1. $7/8 + 1/2 =$

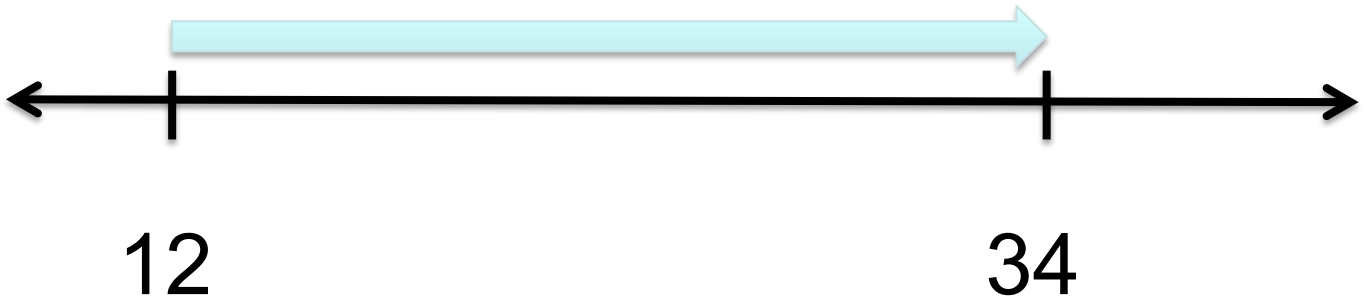
2. $2\ 7/8 + 3\ 3/4 =$

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Number Talks In Response to Common Errors

1. $\frac{3}{4} - \frac{1}{2}$
2. 5.40 × 0.15
3. -3 + -6
4. (x + 2)(x + 3)
5. A 150 mile trip took 5 hours. How far can I travel in 9 hours?

34 – 12



What is the distance between the two numbers?

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Strategies for Adding and Subtracting Integers

- Students understand 5 – 3 as the missing addend in

  3 + ? = 5…

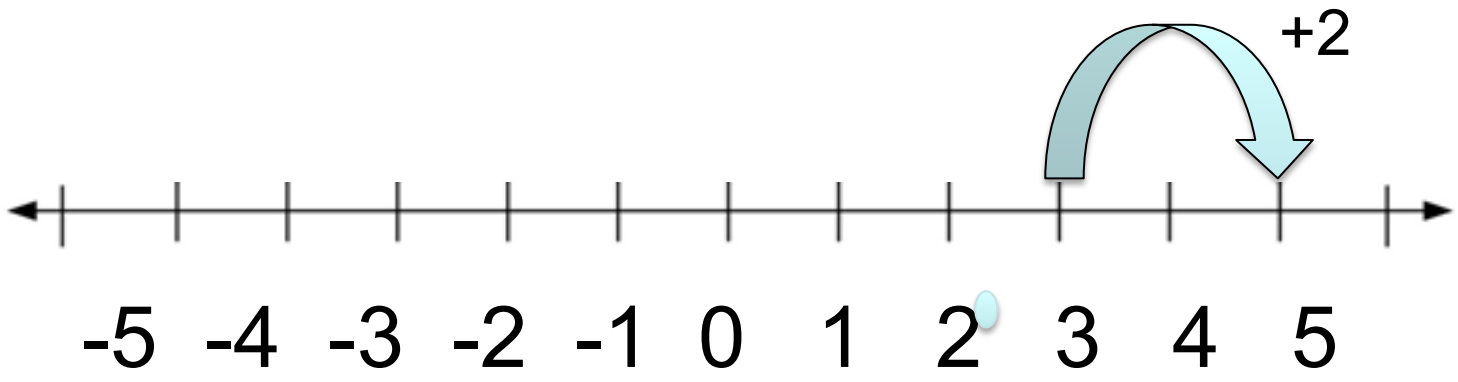
- Integer chips (whether chips are used or not, Standards require that students eventually understand location and addition of rational numbers on the number line)…

- On the number lines, [3 + ? = 5] is represented as the distance from 3 to 5 or direction on the number line by saying how you get from 3 from 5; by going two units to the right."

http://commoncoretools.me/wp-content/uploads/2013/07/ccssm_progression_NS+Number_2013-07-09.pdf, pages 9-10

Strategies for Adding and Subtracting Integers

"On the number lines, [3 + ? = 5] is represented as the distance from 3 to 5 or direction on the number line by saying how you get from 3 from 5; by going two units to the right."



http://commoncoretools.me/wp-content/uploads/2013/07/ccssm_progression_NS+Number_2013-07-09.pdf, pages 9-10

Strategies for Adding and Subtracting Integers

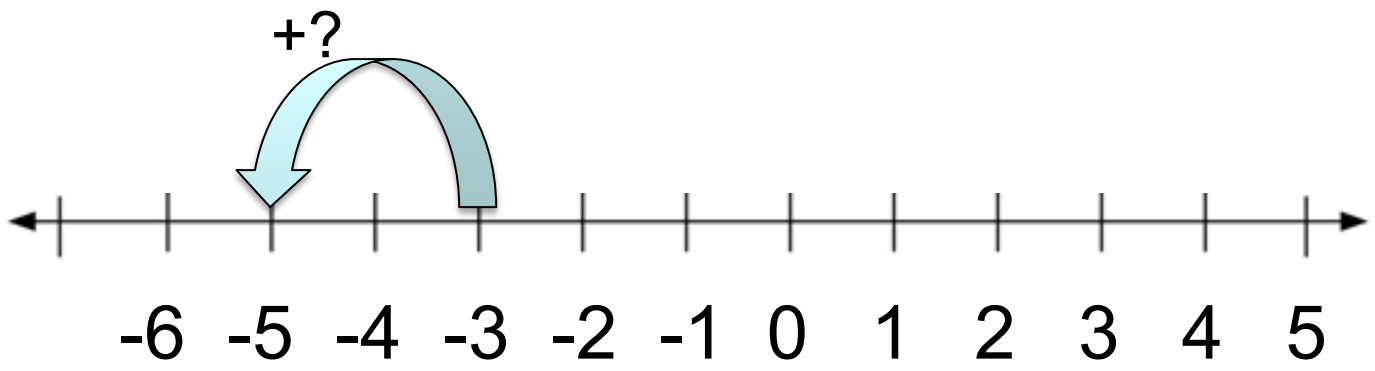
(-5) – (-3) = How to write as a missing addend?

(-3) + ? = (-5)

-Using a number line,

-How do you get from -3 to -5?

-Since -5 is two units to the left of -3 on the number line, the missing addend is -2.



http://commoncoretools.me/wp-content/uploads/2013/07/ccssm_progression_NS+Number_2013-07-09.pdf, page10

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Integer Number Talks

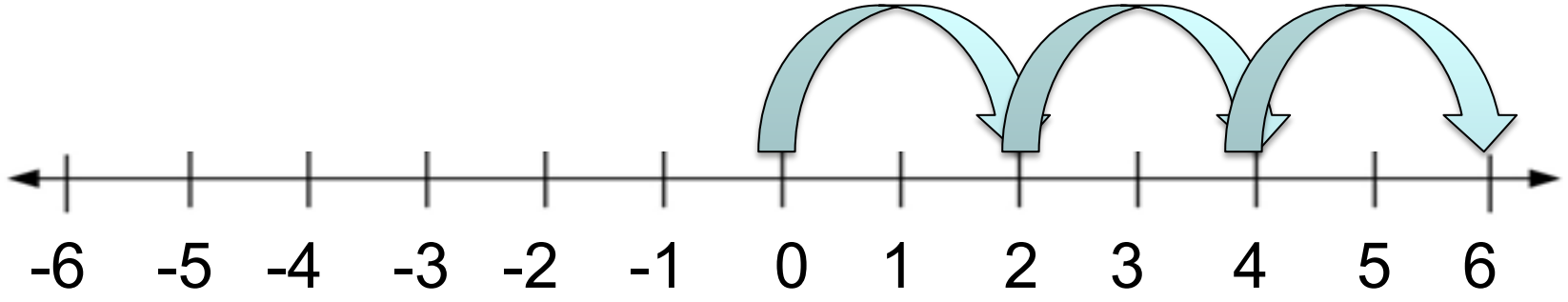
1. (-7) – (-3)

2. 5 – (-2)

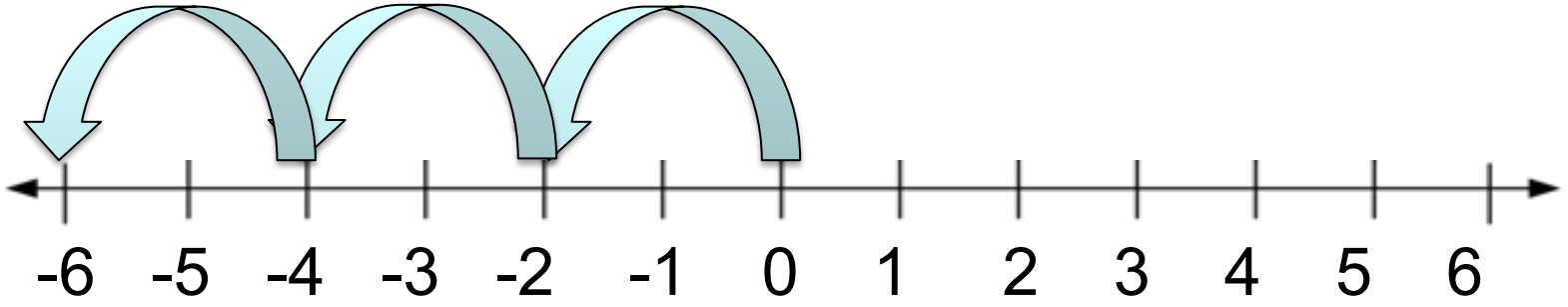
SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Strategies for Multiplying and Dividing Integers

Multiplying 3 x 2 is the same as 3 sets of 2 or 2 + 2 + 2 = 6 or 3 jumps to the right on the number line.



Multiplying 3 x (-2) is the same as 3 sets of -2 or (-2) + (-2) + (-2) = -6 or 3 jumps to the left on the number line.



SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Strategies for Multiplying and Dividing Integers

Relationship of multiplication and division.

(-2) x 4 = ? is the same as ? ÷ 4 = (-2).

What about -2 x -3?

This is saying I have -3 sets of -2, or -(-2)-(-2)-(-2), which is 6.

Or we could use the relationship between multiplication and division ? ÷ (-3) = (-2)

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Integer Multiplication/Division Number Talk

1. 4 x -2

2. (-16) ÷ (-2)

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Why "Middle School" Number Talks?

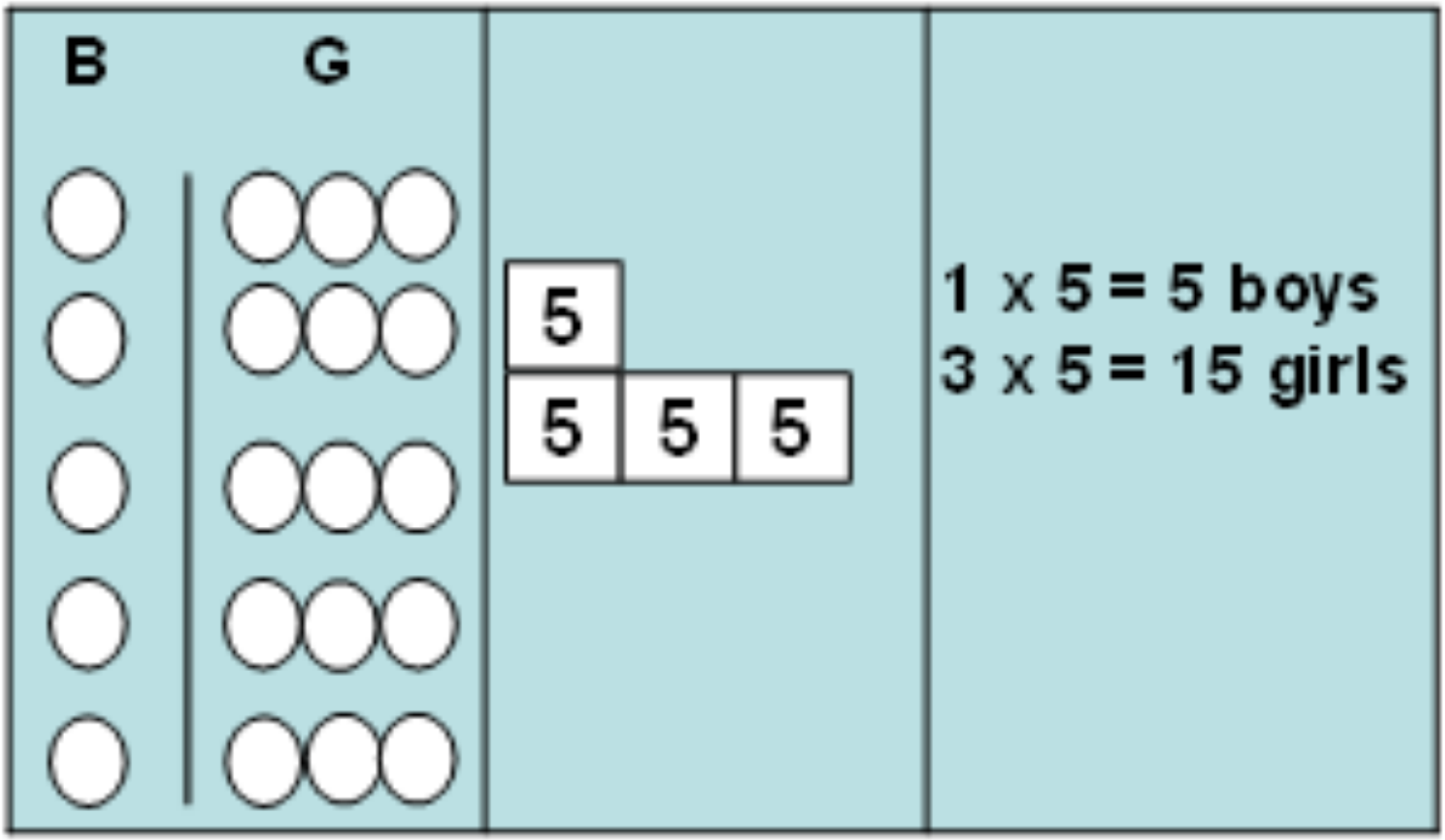
Examining Common Errors:

1. $\frac{3}{4} - \frac{1}{2}$
2. 5.40 × 0.15
3. -3 + -6
4. (x + 2)(x+3)
5. A 150 mile trip took 5 hours. How far can I travel in 9 hours?

Proportional Reasoning

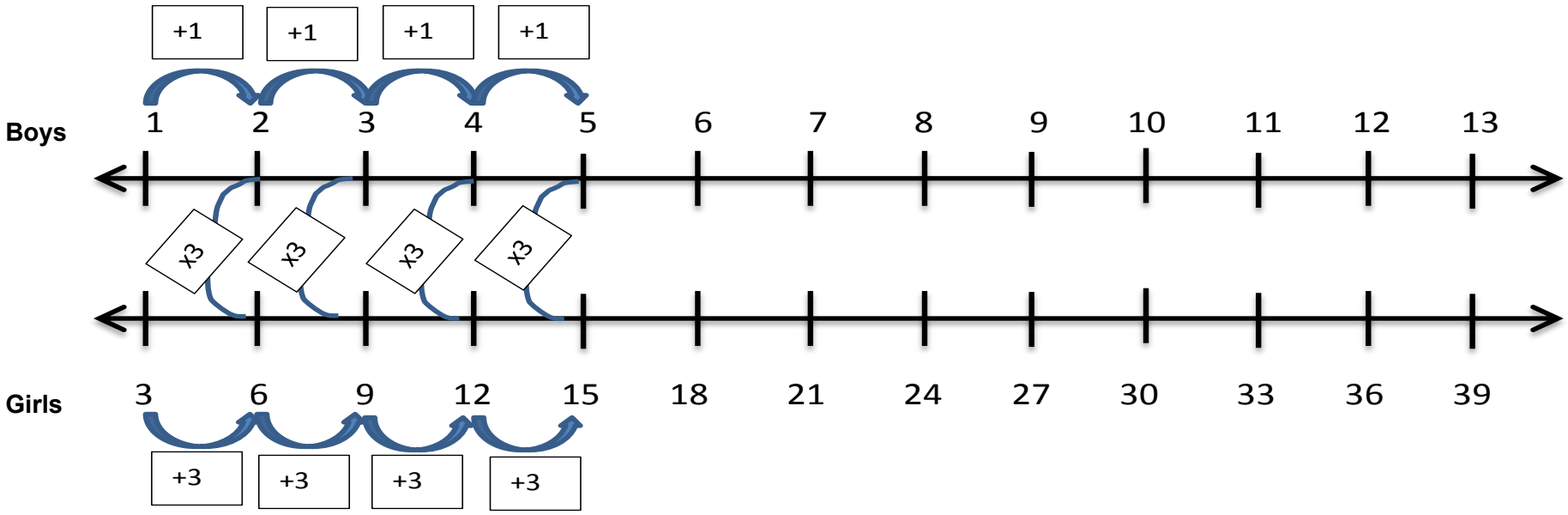
- The ratio of boys to girls in a school newspaper club is 1 to 3. There are 5 boys in the newspaper club.

- How many girls are there? Solve this problem in two different ways.


B
G
5
5
5
5
1 x 5 = 5 boys
3 x 5 = 15 girls

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Double Number Line



- Shows the additive and multiplicative structure.

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Proportional Reasoning

A 150 mile trip took 5 hours.

How far can I travel in 9 hours?

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Session Goals

In this session we will:

- Use models and tools that support student understandings and proficiencies called for in the Common Core State Standards
- Recognize and support students' understandings of the mathematical properties
- Share strategies in ways that emphasize the important mathematical ideas that are inherent in the strategies

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

What is a Number Talk?

Number Talks are a valuable classroom *routine* for:

- making sense of mathematics
- developing efficient computation strategies
- communicating reasoning
- and proving solutions

Number Relationships

"When we ask students questions about relationships, properties, and procedures associated with number concepts, we help our students make important mathematical connections between numbers and their representations."

From *Good Questions for Math Teaching* by Lainie Schuster and Nancy Canavan Anderson, page 17

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

Final Reflection

What impact might ***Middle School Number Talks*** have in your math classroom?

SCHOLASTIC ACHIEVEMENT PARTNERS | Math Solutions FOUNDED BY MARILYN BURNS

THANK YOU!

COME TO BOOTH #300 PRESENTATION AT:

http://mathsolutions.com/contact-us/speaker-presentations/