Building Number Sense in Middle School Through Number Talks

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Friday, September 28, 2018
10:20 am – 11:30 am
William and Mary College Math Day
Holly A
Inspire a culture of Math Achievement
We believe all students can succeed in math.
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Founded by Marilyn Burns.
Questions to Consider:

• How would you describe your students’ number sense?
• What is your role in developing number sense in your schools/classrooms?
“The teaching of fractions must be acknowledged as critically important and improved before an increase in student achievement in algebra can be expected.”

2008 National Mathematics Advisory Panel, xvii, 17
Shade \( \frac{1}{3} \) of the rectangle.

Correct 73%
Incorrect Student Responses
Kim, Les, Mario, and Nina each had a string 10 feet long.

- Kim cut hers into fifths.
- Les cut his into fourths.
- Mario cut his into sixths.
- Nina cut hers into thirds.

After the cuts were made, who had the longest pieces of string?
Research

Research confirms that conceptual understanding directly impacts students’ abilities to understand and correctly apply procedures.

Therefore, it is important to build conceptual understanding of fractions, decimals, and percentages before procedural knowledge.
Number Talks

• A 5- to 15-minute classroom routine

• Consist of purposefully crafted problems that are solved mentally

• Provide an opportunity for students to discuss the variety of ways they think of their solutions
\frac{1}{2} + \frac{7}{8}
Four Foundational Principles

1. Establish a safe learning community.
“1/2 + 7/8: Thinking about Efficient Strategies” from *Number Talks: Fractions, Decimals, and Percentages* by Sherry Parrish and Ann Dominick. Copyright © Math Solutions Publications. All rights reserved.
Key Actions to Build A Safe Learning Community

• Be curious about what students think.
• Ask open-ended questions.
• Wait for students to respond.
• Listen carefully.
• Expect students to listen to and respect each other’s ideas.
Four Foundational Principles

1. Establish a safe learning community.

2. Use purposeful problems.

3. Record with purpose.
Benefits of Purposeful Recording

• Makes mathematical thinking public
• Focuses on the mathematics underlying the strategy
• Serves as a resource for students as they solve future problems
Four Foundational Principles

1. Establish a safe learning community.
2. Use purposeful problems.
3. Record with purpose.
4. Know when to ask and when to tell.
Where does $\frac{1}{2}$ belong?
Number Talks Using Linear Models

Where should the fractions be placed?

\[
\frac{1}{3}, \frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{1}{2}, \frac{2}{3}
\]

\[
\frac{5}{8}
\]

\[
\frac{3}{8}
\]

0, \frac{1}{4}, 1, \frac{3}{4}, 2
Consider…

1. What evidence of fractional reasoning do you see students using?

2. Discuss evidence of the Four Foundational Principles that are inherent in every number talk.
“Placing 0.9, 0.13, 0.255 on the Number Line: Connecting Fractions to Decimals” from *Number Talks: Fractions, Decimals, and Percentages* by Sherry Parrish and Ann Dominick. Copyright © Math Solutions Publication. All rights reserved.
Consider…

1. What evidence of fractional reasoning do you see students using?

2. Discuss evidence of the Four Foundational Principles that are inherent in every number talk.
Which Does Not Belong?

• 2, 3, 15, 23
• 9, 16, 25, 43
• \(\frac{1}{2}, 2, 8, 16\)

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Tell Me All You Can Prompts

- The answer is going to be about ___ because ____.
- The answer is going to be between ___ and ___ because ____.
- The answer is going to be less than ___ because ____.
- The answer is going to be greater than ___ because ____.
\[
\frac{11}{12} + \frac{12}{13}
\]

• The answer is going to be about ___ because ____.
• The answer is going to be between ___ and ___ because ____.
• The answer is going to be less than ___ because ____.
• The answer is going to be greater than ___ because ____.
25% of 80

- The answer is going to be about ___ because ____.
- The answer is going to be between ___ and ___ because ____.
- The answer is going to be less than ___ because ____.
- The answer is going to be greater than ___ because ____.
Final Processing

• How would the Four Principles support you with implementing number talk routines (ex. Number Talks, Which Doesn’t Belong, Tell Me All You Can)?

• What is your role in supporting the implementation of number talks routines? How will these routines support student learning?

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Thank You!

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