Best Practices in Tier 1 Math Instruction



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Introduce yourself. Describe your role as an educator. Describe the mathematics you support.



Share fun things from today and tag @sarahpowellphd!











Precise language











Which are areas of concern with regard to the language of mathematics?



Use formal math language

Use terms precisely







What number is in the tens place?

What digit is in the tens place? What is the value of the digit in the tens place?

Why this is important...

- A number refers to the entire amount.
- The 3 in the tens place value is not a number, but rather a digit in the number 135.
- Reinforces conceptual understanding of place value.

135

• Emphasizes that 3 is part of the number 135 with a value of 30.



The alligator eats the bigger number

is less than OR is greater than

Why this is important...

- Students must learn how to read and write the inequality symbols.
- Students must learn to read equations correctly from left to right because < and > are two distinct symbols.







top number and bottom number

numerator and denominator

Why this is important...

- Identifying that there are two separate (whole) numbers suggests that whole number properties can be applied to fractions.
- Emphasizing that a fraction is ONE number with ONE magnitude on a number line that is communicated with a numerator and denominator is important.



reduce the fraction

rename OR find equivalent OR simplify

Why this is important...

• Reducing suggests that the quantity or magnitude of the new number will be less than the original number.



Four point seven Four point oh seven

Four and seven tenths Four and seven hundredths

Why this is important...

• Accurately shares the magnitude of the decimal.

4.7 4.07

• Emphasizes place value.













reflections, translations, rotations

Why this is important...

- The informal language helps children remember the actions, but this vocabulary is not used on assessments.
- Use the formal mathematical terms.





What are examples of, "Instead of ____, Say ____?"

Instead of that	Say this



Use formal math language

Use terms precisely









Improper fraction 8 5	Proportion $\frac{2}{5} = \frac{8}{20}$
Mixed number 1 ³ / ₅	Ratio 4:3
Proper fraction 2 9	Unit fraction $\frac{1}{6}$
	D

Equation	9x	-	4	=	7x
Expression	9x	-	4		
Formula	۵²	+	b ²	=	C ²
Function	f(x)			
Inequality	9x	-	4	>	6x
					С

XA++

Rubenstein & Thompson (2002)





















XA+H

Rubenstein & Thompson (2002)







Which terms do your students not use precisely?



Use formal math language

Use terms precisely



1. Use graphic organizers





Dunston & Tyminski (2013)



1. Use graphic organizers

Word	Lightbulb Word		
Definition	Picture		

Dunston & Tyminski (2013)



2. Have students create vocabulary cards



6. Equal: having the same amount or value.





3. Have students create glossaries



Numerator: how many parts of the whole



Odd number: a number not divided evenly by 2

- Ex. 1, 3, 5, 7, 9....

Percent: a specific number in comparison to 100

- 74%

Polygon: any enclosed shape that is made up of 3 or more straight lines





4. Create a word wall










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5. Play word games





Math Lingo





What are other ways to support learning mathematics vocabulary?



Precise language

1. Use graphic organizers

- 2. Have students create vocabulary cards
- 3. Have students create glossaries
- 4. Create a word wall
- 5. Play word games

Multiple Representations









Three-dimensional objects

















Two-dimensional images



















Two-dimensional images









Numerals and symbols and words

2 + 8 = 10 34 = 3 tens and 4 ones

$$x - 6 = 8$$
 4,179
+ 569





If you are left handed: What's one of your favorite hands-on manipulatives?

If you are right handed: What's one of your favorite virtual manipulatives?



Multiple Representations

- 1. Use hands-on tools
- 2. Use drawings and pictures
- 3. Use virtual manipulatives
- 4. Tie representations to the abstract

5. Emphasize conceptual and procedural knowledge



Fluency Building



Addition	Subtraction
Multiplication	Division

- Fluency is doing mathematics easily and accurately.
- Fluency in mathematics makes mathematics easier.
- Fluency provides less stress on working memory.
- Fluency helps students build confidence with mathematics.



Addition	Subtraction
Multiplication	Division

- With fluency, it is important to emphasize both conceptual learning and procedural learning.
- Fluency is not strictly procedural!



Addition: Total (Part-Part-Whole, Combine)

Count one set, count another set, put sets together, count sum



2 + 3 = 5



Addition: Join (Change Increase)

Start with a set, add the other set, count sum



2 + 3 = 5



Subtraction: Separate (Change Decrease)

Start with a set, take away from that set, count difference



5 - 3 = 2



Subtraction: Difference (Compare)

Compare two sets, count difference



5 - 3 = 2



Multiplication: Equal Groups

Show the groups, show the amount for each group, count product



$3 \times 2 = 6$



Multiplication: Equal Groups

Show the groups, show the amount for each group, count product



$3 \times 2 = 6$



Multiplication: Comparison

Show a set, then multiply the set



$3 \times 2 = 6$



Division: Equal Groups (Partitive Division)

Show the dividend, divide equally among divisor, count quotient





Division: Equal Groups (Quotative Division)

Show the dividend, make groups of the divisor, count groups





Addition	Subtraction
Multiplication	Division

- Build fluency with math facts.
 - Addition: single-digit addends
 - Subtraction: single-digit subtrahend
 - Multiplication: single-digit factors
 - Division: single-digit divisor



Cover, Copy,	Compare	-		Taped Pr	oblems	
9	8 × 6		6 × 5	8 × 6	7 × 9	6 <u>× 8</u>
<u>× 0</u> 54 7	48 6 5 6+3=	File Folder	9 × 8	8 × 5	7 × 8	6 × 6
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right 2022 Sarah R. Powell, Ph.	D.				×A	+





DAILY and BRIEF















DAILY and BRIEF







Addition	Subtraction
Multiplication	Division



What are other ways to practice fluency?



Addition	Subtraction
Multiplication	Division

• Build fluency with whole-number computation

15	1009
<u>+ 28</u>	<u> </u>
23	7250
<u>× 9</u>	÷ 15



Addition	Subtraction
Multiplication	Division

• Build fluency with rationalnumber computation

1.4		7.892
+ 3.9	• •	0.14

 $\frac{2}{3} \times \frac{3}{4}$

 $\frac{9}{4}$ - $\frac{3}{8}$



Addition	Subtraction	•
Multiplication	Division	

• Build fluency with integer computation

 $-135 \div 2 = \qquad \qquad 6 \\ \times -12$

-14 - (-7) = 1.4 + -3.9



Fluency Building

1. Build fluency with facts

2. Build fluency with computation and beyond

3. Emphasize conceptual understanding

4. Do brief fluency practice every day






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