

# Reimagining Fluency through Powerful Routines in the Secondary Math Classroom

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**NOTES**

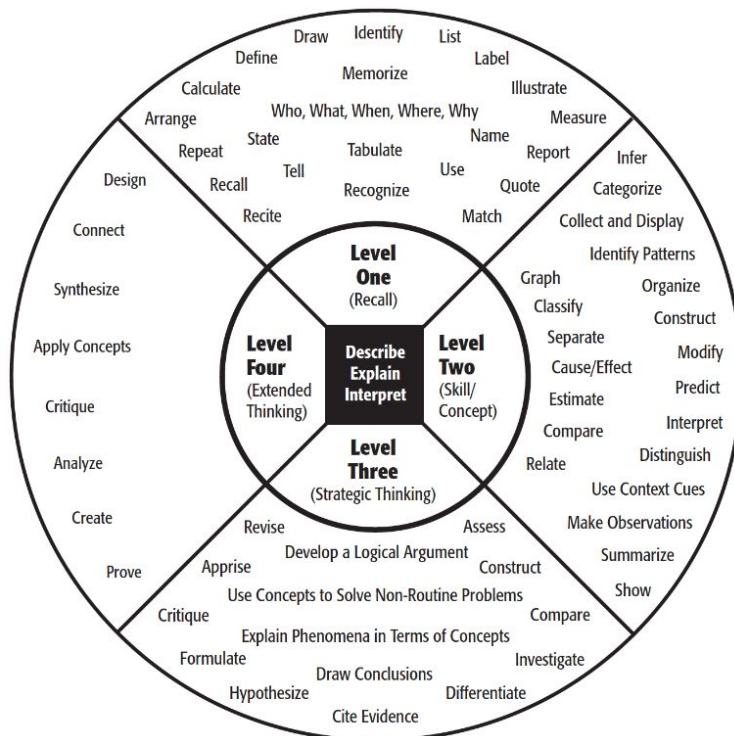
“We encourage children to read for enjoyment, yet we rarely encourage them to “math” for enjoyment.”

*Rachel McAnallen,  
author and math teacher*

“Somehow it's O.K. for people to chuckle about not being good at math. Yet if I said, 'I never learned to read,' they'd say I was an illiterate dolt.”

*Neil deGrasse Tyson,  
astrophysicist*

## Depth of Knowledge (DOK) Levels



# According to NCTM

Procedural fluency is:

- ★ the ability to apply procedures accurately, efficiently, and flexibly;
- ★ to transfer procedures to different problems and contexts;
- ★ to build or modify procedures from other procedures;
- ★ and to recognize when one strategy or procedure is more appropriate to apply than another.



Reference: NCTM Position Statement on Fluency

## *Complete tasks with mathematical fluency.*

Mathematicians who complete tasks with mathematical fluency:

- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

### Clarifications:

Teachers who encourage students to complete tasks with mathematical fluency:

- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

Reference: Florida B.E.S.T. Mathematical Thinking and Reasoning Standards

# Fluency Routines



Short, structured activities



Visible thinking



High-level thinking



Big math ideas & insights

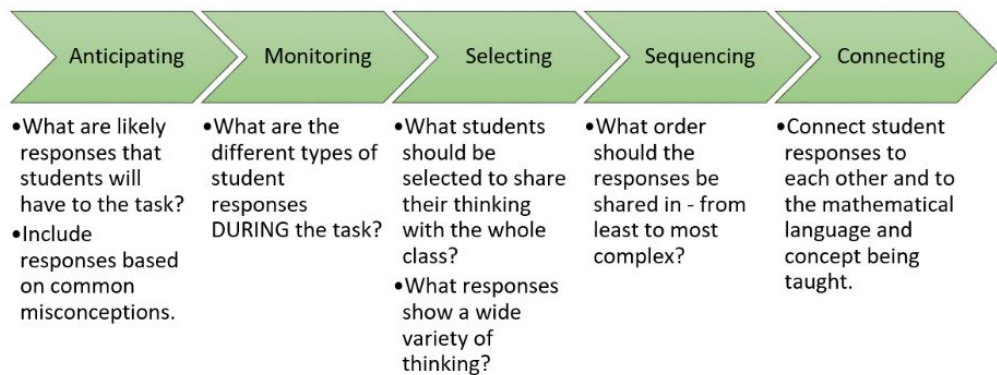


Discussion focused



Confidence as mathematical thinkers

## Five Practices for Facilitating Routines



Smith, Margaret, and Mary Kay Stein. *5 Practices for Orchestrating Productive Mathematics Discussions*. The National Council of Teachers of Mathematics, Inc., 2018.

## Number Talk



$$2.3 \times 1.8$$

## Mystery Number



$$\frac{1}{\square} + \frac{1}{\square} + \frac{1}{\square} = \frac{9}{24}$$



$$-\square.\square \times 0.\square < |1|$$

# Doesn't Fit



$$3^5(3^1)$$

$$2^3(2^2)$$

$$(2^3)^2$$

$$2^4 \cdot 2^2$$

# Number Riddle



- I am a mixed number addition expression.
- My denominators are two different prime numbers.
- My sum is between  $-1$  and  $-2$ .



- I am a subtraction expression.
- Both of my terms are negative integers.
- My difference is negative.



$$\square + 2 = |7|$$



$$5.99 + 0.99$$



- I am a rational number.
- I am greater than 0.5 and less than 1.
- As a fraction, my denominator is a factor of 30.



$$\begin{array}{ll} -3 \times (-4) & 2 \times (-3) \times 2 \\ -48 \div 4 & 7 \times (-1) \end{array}$$



$$\begin{array}{ll} \sqrt{16} & 200\% \\ \sqrt[3]{-8} & -\sqrt{4} \end{array}$$



$$\frac{9 \times 10^{\square}}{-3 \times 10^{\square}} = \square \times 10^4$$



- I am a set of two ordered pairs.
- My slope is a positive number.
- My slope is an improper fraction.



$$x^2 + 3 = 19$$

# Resources for Fluency Routines

## Open Educational Resources:

[www.wodb.ca](http://www.wodb.ca)

[www.openmiddle.com](http://www.openmiddle.com)

[www.stevewyborney.com](http://www.stevewyborney.com)

## Fluency Books:

*Making Number Talks Matter*

by Cathy Humphreys & Ruth Parker

*5 Practices for Orchestrating Productive Mathematics Discussions*

by Margaret Smith and Mary Kay Stein

## EdGems Math Fluency Boards:

A COVER SHEET  
FOR EACH UNIT

PRE- & POST-ASSESSMENTS

50 FLUENCY  
BOARDS PER GRADE

Available as a  
STUDENT CONSUMABLE.

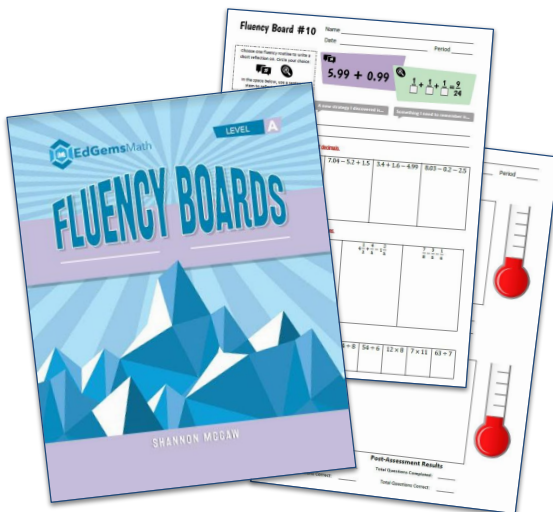


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