



Grades PK-5

"Creating confident, inquisitive problem solvers who are excited to explore math each day."

Board Approved: June 30, 2020

MISSION

The mission of each WCSD math teacher is to grow mathematicians by:

- Making the process of math just as important as the answer to the question
 - Developing conceptual understanding
 - Organizing information mentally

We strive to create a classroom environment where students are confident, inquisitive problem solvers who are excited to explore math each day.

COMMITTEE MEMBERS:

Karen Arbogast Deanna Boyd Holly Dietry Brenda Fleming Rebecca Furlong Lindsey Gabor Amy Hall Abby Hughes Katherine Keener Mike Lipnos Karen Manges Julia Myers Jennifer Nash Sara Oberst Lexi Pacheco Suzi Parker **Erin Rammel Katy Smith Ashley Tomassetti Eric Vizzo Martin Yoder**



HOW DO WE GROW MATHEMATICIANS?

Our classrooms are student-centered environments where all learners are empowered to build their understanding of mathematics based on their own context. This will honor them as mathematicians and as individuals. They will develop the ability to take things they already know, make connections to new situations, and then build new understanding.

We accomplish this by ensuring our young people are exposed regularly to the "roots" of their mathematics understanding. By designing purposeful settings involving *Structure, Subitizing, Counting, Place Value, Fraction Readiness, Vocabulary,* students will flourish in their mathematical thinking, problem solving and behaviors. When the "roots" are cared for properly, learners will become flexible risk-taking problem solvers who are accurate and confident in their mathematics (the fruit). *See diagram on next page. Our responsibility as teachers is to build a strong foundation while the students are in charge of developing their knowledge. The learning and connections become easy and natural when the roots have been cared for properly.



GROWING MATHEMATICIANS



COMPONENTS OF A MATH CLASS

Fluency - 5-10 minutes: It is not only for basic facts, but concepts or skills. Fluency with facts/skills will allow access to more sophisticated math computation.

Computation - 10-20 minutes: Building Number Sense and Mathematical Strategies (Number Talks) - It is when students learn to create, invent and develop strategies to solve computational problems (100% student-driven).

Model and Apply - 20-30 minutes: Exploring with Math - It is when students become mathematicians and connecting mathematics to the world.



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COMPONENT 1:

FLUENCY

*Fluency - Ability to use efficient, accurate, and flexible methods and computing! Fluency does not imply time tests. (ODE Standards)



WHAT IT IS:

| K-2 | 3-4 | 5 |
|---|---|---|
| Counting by 1's, 10's, 100's forward and backward on and off multiples across decades, centuries, millen- nium. | • Counting by 1's, 10's, 100's forward and backward on and off multiples across decades, centuries, millennium. | Counting by 1's, 10's, 100's forward and backward on and off multiples across decades, centuries, millen- nium. |
| • Structure of 5, 10, 20. | • Counting by fractional parts. (unit fractions) | Counting by decimal parts and by non-unit fractions. |
| | • Extending the structure of ten into 1/10, 10, 100. | Skill fluency in areas of equivalence (fractions, deci- |
| | Multiplicative structure (using patterns and relationships be- | mals, place value parts, etc.) |
| | tween changes in the amount of groups and how many are in each group.) | • Extending the structure of ten into 1/10, .1, .01, 10, 100, etc. |
| | Second semester possible counting by multiples of 3, 4, 6, 7, 8, 9. | |

WHAT IT IS NOT:

K-5

- Not learned through memorization.
- Not computer based practice.
- Not repetitive drill.



COMPONENT 2:

COMPUTATION

"Students exhibit computational fluency when they demonstrate flexibility in the computational methods they choose, understand and explain these methods, and produce accurate answers efficiently." — Linda M. Gojak

BUILDING NUMBER SENSE AND COMPUTATION STRATEGIES (NUMBER TALKS)

WHAT IT IS:

- 10-20 mins.
- Rich classroom discussion
- Connecting Math-to-Math
- Precise Vocabulary
- Partnerships
- Mental and/or written
- Visual thinking
- Connecting Ideas

WHAT IT IS NOT:

- Only about a product
- Focus only on a correct answer
- Worksheets
- Memorization
- Teaching strategies
- Promoting certain strategies
- Teaching isolated skills

NUMBER TALKS

Class discussions don't give answers/strategies or confirm answers; ask students to:

- 1. Agree/disagree
- 2. Add-on
- 3. Compare thinking
- 4. Surface discrepancies
- 5. Revisit previous thinking

Student Behavior

- Debate
- Notice/wonder
- Conjectures (analytical, logical, deductive thinking)
- Process
- Peer feedback, discourse, interaction

"Emphasis on conceptualizing rich mathematical ideas and have an expectation that all students make sense and develop a mathematical intuition." p. 221, Zager



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COMPONENT 3:

MODEL AND APPLY

EXPLORING WITH MATH

Mathematizing the world around us Recognizing math in the world and everyday situations Using the practices and habits of mind to solve real-world problems. SMP - Standards for Mathematical Practice

WHAT IT IS:

- Students driving the questions to answer
- Solving and researching real world problems (everyday life, society, and the workplace)
- Focusing on process rather than answer
- Representing situations with mathematical models (expressions)
- Penalty-free learning
- Student led
- Proving/disproving

WHAT IT IS NOT:

- Worksheets
- I do, we do, you do
- Solving problems for a single answer
- Review of learned skills

| Patterns and Relationships of Number System Should be Explored Weekly Through Conceptual Place Value Tools | | | |
|--|-----------------------|--|--|
| Arrow Cards Link | Number Cards Link | | |
| Digit Cards Link | Place Value Dice Link | | |
| Hidden Picture Link | Tiny Tens Link | | |
| Base Ten Blocks Link | Cuisenaire Rods Link | | |





_Grade Math

Class

| day |
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LESSON PLANNING TEMPLATE SAMPLE

RESEARCH/RESOURCES *ARTICLES*

| Title | Author | Publisher |
|---|--|--|
| Never Say Anything a Kid Can Say | Steven C Reinhart | Mathematics Teaching in the Middle School |
| 13 Rules That Expire | Karen S Karp, Sarah B. Bush, Barbara J Doughterty | Teaching Children Mathematics |
| Warning Signs! Recognize three common instructional moves | Victoria R Jacobs, et al. | Teaching Children Mathematics |
| Fluency: Simply Fast and Accurate? I Think Not! | Linda Gojak | NCTM |
| Number Talks: Gateway to Sense Making | Kathy Sun, Erin Baldinger, Cathy Humphreys | Mathematics Teacher |
| The Power of Collective Efficacy | Jenni Donohoo, John Hattie, Rachel Eells | ASCD Educational Leadership |
| Managing Complex Change | Dr. May Lippitt | Enterprise Management Ltd. |
| Number Talks Build Numerical Reasoning | Sherry Parrish | Teaching Children Mathematics |
| Early Mathematics Fluency with CCSM | Gabriel Matney | Teaching Children Mathematics |
| Teaching Without Telling: Computational Fluency and Understanding through Invention | Daniel Heuser | Teaching Children Mathematics |
| Fluency Without Fear | Jo Boaler | You Cubed at Stanford University |
| Psychological Imprisonment or Intellectual Freedom | Jo Boaler, Sarah Kate Snelling | You Cubed at Stanford University |
| Why Our Coercive System of Schooling Should Topple | Peter Gray | Freedom to Learn |
| Schooltalk: Rethinking What We say About – and to – Students Every Day | Mica Pollock | Teaching Tollerance |
| Research Shows Students Learn Better When They Figure Things Out on Their Own | Martin Bushkuel | MIND Research Institute |



RESEARCH/RESOURCES BOOKS

| Title | Author | Publisher |
|---|---|-----------|
| Principles to Actions: Ensuring Mathematical Success for All | Steven Leinwand, Daniel Brahier, DeAnn Huinker, et al | NCTM |
| The Impact of Identity in K-8 Mathematics | Julia Aquirre, Karen Mayfield-Ingram, Danny Bernard Martin | NCTM |
| Making Number Talks Matter | Cathy Humphries, Ruth Parker | Stenhouse |
| Intentional Talk | Elham Kazemi, Allison Hintz | Stenhouse |
| Becoming the Math Teacher You Wish You'd Had | Tracy Johnston Zager | Stenhouse |
| Cognitive-Based Assessments of Addition and Subtraction | Michael Battista | Heinemann |
| Cognitive-Based Assessments of Multiplication and Division | Michael Battista | Heinemann |
| Cognitive-Based Assessments of Place Value | Michael Battista | Heinemann |
| Cognitive-Based Assessments of Fractions | Michael Battista | Heinemann |

