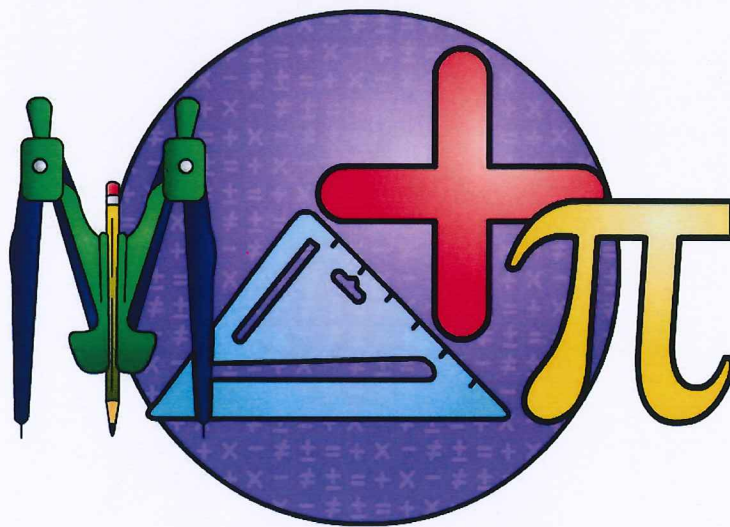


# Elementary Math Instruction Guide



*Northfield Public Schools*

*Updated 8.21.17*

<p style="text-align: center;"><b>Elementary Math Overview</b> <b>Table of Contents</b></p>
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- 1. District Resources for K-5 Math Instruction**
- 2. Core Math Instructional Components**
- 3. Math Fact Fluency Expectations**
- 4. Problem Solving Process**
- 5. Standards of Mathematical Practice**
- 6. Positive Math Norms**
- 7. Rich Mathematical Tasks**
- 8. Report Card & Conference Report Information - Math**

## District Resources for K-5 Math Instruction

*Northfield Public Schools*




*For more information, visit the "MATHEMATICS K-5: Northfield Public Schools" Google folder and the "K-5 Response to Intervention" page at the NPS district website.*

Area	Resources	K	1	2	3	4	5
Core Instruction	Everyday Math 4 <sup>th</sup> Edition Full Classroom Kit & ConnectEd (online resources)	X	X	X	X	X	X
	EM4 SMARTBoard Lessons	X	X	X	X	X	X
	Math Talk: Teaching Concepts & Skills Through Illustrations and Stories	X	X				
	Xtra Math App		X	X	X	X	X
	Evan Moor Daily Word Problems eBook		X	X	X	X	X
	Evan Moor Basic Math Skills eBook		X	X	X	X	X
	Hands-On Equations Kit: Algebra				X	X	X
	Preparing for the MCA III Binder				X	X	X
	Rise & Shine MCA III Mathematics Prep				X	X	X
Area	Resources	K	1	2	3	4	5
Interventions	Focus Math	X	X	X	X	X	X
	Incremental Rehearsal (Fact Fluency)	X	X	X	X	X	X
	Cover, Copy, Compare (Procedural Fluency)		X	X	X	X	X
	Math Elevations				X	X	X
Area	Resources	K	1	2	3	4	5
Enrichment & Extension	Everyday Math Differentiation Handbook & Online Differentiation System	X	X	X	X	X	X
	Becoming a Problem Solving Genius, by Ed Zaccaro				X	X	X
	Primary Grade Challenge Math, by Ed Zaccaro				X		
	Algebra, by Ed Zaccaro					X	
	Challenge Math, by Ed Zaccaro						X
	Other items in grade level "High-Ability Resources Crate" (one per grade level)				X	X	X



# Core Math Instructional Components

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Observer: \_\_\_\_\_

	<b>Lesson Components</b>
	<b>Learning Target</b> - Teachers post and communicate the learning target for each lesson.
	<b>Warm Up</b> - Students engage in mental math and fluency exercises and daily routines.
	<b>Focus</b> - Best practice instructional and assessment methods support student learning.
	<b>Practice</b> - Students use math boxes, games, apps or other means to develop skills and practice fluency.
	<b>Scaffolding Support and Feedback</b>
	<b>Management</b> - Teacher maintains structure that maximizes student learning and minimizes disruptions.
	<b>Clear Instruction</b> - Teacher provides clear directions and explanations.
	<b>Chunking of Material</b> - Teacher breaks material into manageable steps.
	<b>Effective Pacing</b> - Lesson moves at an appropriate pace to hold students' attention.
	<b>Active Engagement</b> - Teacher uses a variety of methods to engage students and optimize learning.
	<b>Feedback Cycle</b> - Teacher regularly checks for understanding and provides frequent and timely feedback.
	<b>Positive Math Norms</b> - Teacher uses language and activities that promote positive math norms.
	<b>Standards for Mathematical Practice</b>
	<b>Students make sense of problems and persevere in solving them. (SMP1)</b>
	<b>Students reason abstractly and quantitatively. (SMP2)</b>
	<b>Students construct viable arguments and critique the reasoning of others. (SMP3)</b>
	<b>Students model with mathematics. (SMP4)</b>
	<b>Students use appropriate tools strategically. (SMP5)</b>
	<b>Students attend to precision. (SMP6)</b>
	<b>Students look for and make use of structure. (SMP7)</b>
	<b>Students look for and express regularity in repeated reasoning. (SMP8)</b>

Notes:

## Math Fact Fluency Expectations

Northfield Public Schools

Math fact fluency is the process of automatically recalling basic facts within about three seconds. Conceptual and pictorial representations should be used to initially establish understanding of addition, subtraction, multiplication, and division. Once students have established a solid understanding of the operation, fluency should be the next goal.

However, working towards fluency can be difficult and anxiety-inducing for some students. Therefore, educators must always pay attention to the needs of individual students and balance the many important skills of being a mathematician. Ultimately, depth of understanding is more important than the speed at which students calculate.

Math fact fluency can be developed in many ways, depending on the needs of each student. The list below offers a variety of options to help students increase math fact fluency.

- *Xtra Math* app
- *Everyday Math* games
- *Mastering the Basic Math Facts in Addition & Subtraction*, by Susan O'Connell
- *Mastering the Basic Math Facts in Multiplication & Division*, by Susan O'Connell
- Other apps, flash cards, games, activities, etc. of your choice

### Northfield Year-End Fluency Benchmark

K	<i>Fluently add and subtract within 5. (CCSS.K.OA.A.5)</i>
1	<i>Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. (CCSS.1.OA.C.6)</i>
2	<i>Fluently add and subtract within 20 using mental strategies. (CCSS.2.OA.B.2)</i>
3	<i>Fluently multiply and divide within 100. (CCSS.3.OA.C.7)</i>
4	<i>Fluently add and subtract multi-digit whole numbers using the standard algorithm. (CCSS.4.NBT.B.4)</i>
5	<i>Fluently multiply multi-digit whole numbers using the standard algorithm. (CCSS.5.NBT.B.5)</i>

Note: Traditional algorithms need to be taught to mastery. Alternative standard algorithms should continue to be taught and used as provided in *Everyday Math*, the district resource for math instruction. Using alternative algorithms encourages multiple approaches to solving problems and helps to develop stronger number sense.



# PROBLEM-SOLVING PROCESS

Adapted from Everyday Math - 2015

1	• READ
2	• UNDERSTAND
3	• PLAN
4	• SOLVE
5	• CHECK

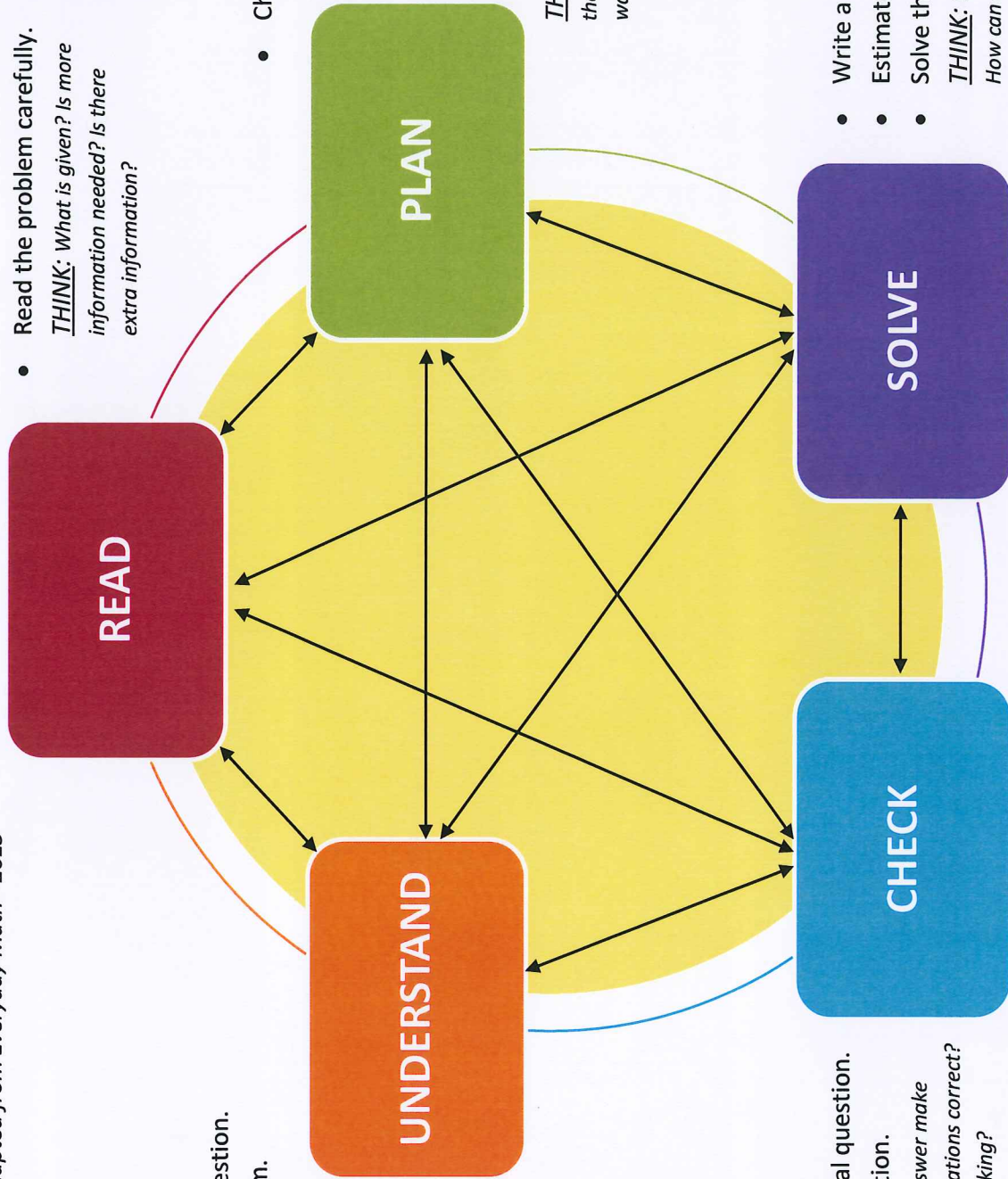
- Read the problem carefully.  
THINK: What is given? Is more information needed? Is there extra information?

- Circle key words.
- Underline the question.
- Retell the problem.

THINK: What do I need to find out?  
Do I understand all of the words?

- Choose a strategy.
  - Make a chart, table, list or picture.
  - Look for patterns.
  - Use a number line, grid or objects.
  - Make it simpler.
  - Guess and check.
  - Work backwards.

THINK: How can I show the problem in various ways?



- Reread the original question.
- Examine the solution.  
THINK: Does the answer make sense? Are the calculations correct? Can I explain my thinking?

- Write a number model.
- Estimate the answer.
- Solve the problem.  
THINK: What math can help? How can an answer be found?

Number Stories with a Plan



# MATHEMATICS

## STANDARDS and GOALS for MATHEMATICAL PRACTICE

### 1. Make sense of problems and persevere in solving them.

- Make sense of your problem.
- Reflect on your thinking as you solve your problem.
- Keep trying when your problem is hard.
- Check whether your answer makes sense.
- Solve problems in more than one way.
- Compare the strategies you and others use.

### 2. Reason abstractly and quantitatively.

- Create mathematical representations using numbers words, pictures, symbols, gestures, tables, graphs, and concrete objects.
- Make sense of the representations that you and others use.
- Make connections between representations.

### 3. Construct viable arguments and critique the reasoning of others.

- Make mathematical conjecture and arguments.
- Make sense of others' mathematical thinking.

### 4. Model with mathematics.

- Model real-world situations using graphs, drawing, tables, symbols, numbers, diagrams, and other representations.
- Use mathematical models to solve problems and answer questions.

### 5. Use appropriate tools strategically.

- Choose appropriate tools.
- Use tools effectively and make sense of your results.

### 6. Attend to precision.

- Explain your mathematical thinking clearly and precisely.
- Use an appropriate level of precision for your problem.
- Use clear labels, units, and mathematical language.
- Think about accuracy and efficiency when you count, measure, and calculate.

### 7. Look for and make use of structure.

- Look for mathematical structures such as categories, patterns, and properties.
- Use structures to solve problems and answer questions.

### 8. Look for and express regularity in repeated reasoning.

- Create and justify rules, shortcuts, and generalizations.



# Positive Math Norms

## Everyone can learn math to the highest levels.



Encourage students to believe in themselves. Use brain research to show students that there is no such thing as a math person. Continue to develop growth mindset thinking.

## Mistakes are valuable.



Tell students that mistakes will be valued because we know that our brains are growing when mistakes happen. Paying attention to the learning opportunities within mistakes is incredibly liberating for our students.

## Questions are really important.



Tell your students that asking questions about math is really important. Research shows that question-asking is linked to high achievement. Students should feel welcome to ask a question whenever they have one.

## Math is about creativity and making sense.



Orchestrate opportunities for students to visualize patterns and create solution paths that others can see, discuss and critique. The key to understanding math is making sense of it, so regularly ask your students, "Why does that make sense?"

## Math is about connections and communicating.



Provide activities that are interrelated so students can see the connections between math concepts. Use real-world situations to apply skills. Encourage math conversations and writing that lead to deeper understanding.

## Value depth over speed.



Balance the many important skills of being a mathematician. Share with students the importance of thinking deeply and thoroughly through problems to make sense of them. Fast computation, without depth of thought is not the primary goal.

## Math class is about learning, not performing.



Keep learning at the forefront of all that you do. Math is a growth subject that takes time for students to learn. Use formative feedback to help students develop math skills and ask questions to clarify misconceptions. Allow exploration through the learning process while working toward a goal.



# RICH MATHEMATICAL TASKS

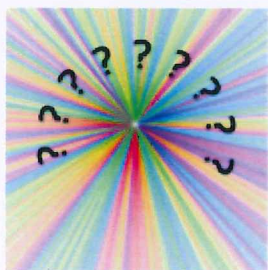
## Five Cs, Questions & Criteria

### Five Cs of Mathematics Engagement

1. Curiosity
2. Connection Making
3. Challenge
4. Creativity
5. Collaboration



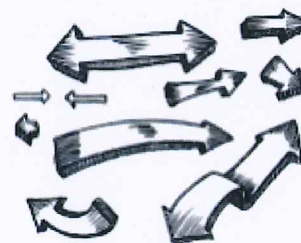
### Six Questions: How can I create a rich math task?



1. Can I open this task to encourage **multiple methods, pathways and representations**?
2. Can I make it an **inquiry task**?
3. Can I **ask the problem before** teaching the method?
4. Can I add a **visual component**?
5. Can I make it **low floor and high ceiling**?
6. Can I add the requirement to **convince and reason**?

### Criteria for a Rich Math Task

1. There are multiple solution pathways.
  - Solutions will **look different**. Students will use **different tools** and **different strategies**.
2. There are multiple entry and exit points.
  - Students will be working on **different mathematical ideas** and having **different struggles**.
3. There is a high level of cognitive demand.
  - **Mistakes** will be made and students will **get stuck**.
4. It requires complex, non-algorithmic thinking.
  - **Tools** other than algorithms will be necessary to complete the task.
5. It requires considerable cognitive effort.
  - **Perseverance, patience** and **stamina** will be required.



## Report Card and Conference Report Information – Math

Student progress is officially communicated to parents/guardians four times throughout the school year:

Time Period	Method
Fall ( <i>October/November</i> )	Conference Report shared at Parent/Teacher Conferences
Winter ( <i>January/February</i> )	Report Cards
Spring ( <i>March/April</i> )	Conference Report shared at Parent/Teacher Conferences
End of Year ( <i>June</i> )	Report Cards

### Conference Reports

Conference Report information is reported through a common form approved at the building level. Teachers complete these forms based on their assessment and observation. This form is distributed on or before the parent-teacher conference date.

### Report Cards

The elementary report card is standards-based. Standards identify the essential skills and knowledge that are to be taught and learned. Teachers are accountable to teach the math standards and benchmarks as outlined in the District Math Frameworks and supported through our curriculum resource, *Everyday Math 4*.

Standards-based grades are communicated using the following scale:

- **4 = Advanced** (*Exceeds the standard with independence; Exceeds expectations for this time of year*)
- **3 = Proficient** (*Meets the standard with independence; Meets expectations for this time of year*)
- **2 = Partially Proficient** (*Making progress toward the standard with support; Meets basic expectations for this time of year*)
- **1 = Not Proficient** (*Lacking expected progress toward the standard; Does not meet basic expectations for this time of year*)
- **NA = Not assessed at this time**

Grades should reflect what students actually know or have achieved, not their behaviors (e.g., effort, participation, late work, missing assignments, etc.). Progress by all students, including those with special needs, is reported against the same criteria. A space for additional comments can be utilized to explain specific observations, strengths or concerns.

Report cards are completed electronically through the Skyward grading program.

### Report Card Categories

The following categories are listed on the Elementary Report Card in the area of math:

- Operations and Algebraic Thinking
- Number and Operations
- Measurement and Data
- Geometry

These categories coincide with the assessments outlined in *Everyday Math 4*.