

Third Grade

DAY-BY-DAY MATH

THINKING ROUTINES

in Third Grade

40 Weeks of Quick Prompts and Activities

The anti-worksheet workbook, including such favorites as:

- What Doesn't Belong?
- Greater Than, Less Than, in Between
- True or False?
- How many more to?
- Reasoning Matrices
- Leg Problems
- Number Talks
- Number Strings
- Number Bonds

Just 10 minutes
a day can build
number sense for
a lifetime!

An Eye On Education Book

Dr. Nicki Newton



Day-by-Day Math Thinking Routines in Third Grade

Day-by-Day Math Thinking Routines in Third Grade helps you provide students with a review of the foundational ideas in math, every day of the week! Based on the bestselling *Daily Math Thinking Routines in Action*, the book follows the simple premise that frequent, rigorous, engaging practice leads to mastery and retention of concepts, ideas, and skills. These worksheet-free, academically rigorous routines and prompts follow grade level priority standards and include whole group, individual, and partner work. The book can be used with any math program, or for small groups, workstations, or homework.

Inside you will find:

- ◆ 40 weeks of practice
- ◆ 1 activity a day
- ◆ 200 activities total
- ◆ Answer Key

For each week, the Anchor Routines cover these key areas: Monday: General Thinking Routines; Tuesday: Vocabulary; Wednesday: Place Value; Thursday: Fluency; and Friday: Problem Solving. Get your students' math muscles moving with the easy-to-follow routines in this book!

Dr. Nicki Newton has been an educator for 30 years, working both nationally and internationally with students of all ages. She has worked on developing Math Workshop and Guided Math Institutes around the country; visit her website at www.drnickinewton.com. She is also an avid blogger (www.guidedmath.wordpress.com), tweeter (@drnickimath) and Pinterest pinner (www.pinterest.com/drnicki7).

Also Available from Dr. Nicki Newton
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Meet the Author

Dr. Nicki Newton has been an educator for 30 years, working both nationally and internationally, with students of all ages. Having spent the first part of her career as a literacy and social studies specialist, she built on those frameworks to inform her math work. She believes that math is intricately intertwined with reading, writing, listening, and speaking. She has worked on developing Math Workshop and Guided Math Institutes around the country. Most recently, she has been helping districts and schools nationwide to integrate their State Standards for Mathematics and think deeply about how to teach these within a Math Workshop model. Dr. Nicki works with teachers, coaches, and administrators to make math come alive by considering the powerful impact of building a community of mathematicians who make meaning of real math together. When students do real math, they learn it. They own it, they understand it, and they can do it. Every one of them. Dr. Nicki is also an avid blogger (www.guidedmath.wordpress.com) and Pinterest pinner (<https://www.pinterest.com/drnicki7/>).

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Introduction

Welcome to this exciting new series of daily math thinking routines. I have been doing thinking routines for years. People ask me all the time if I have these written down somewhere. So, I wrote a book. Now, that has turned into a grade level series so that people can do them with prompts that address their grade level standards. This is the anti-worksheet workbook!

The goal is to get students reflecting on their thinking and communicating their mathematical thinking with partners and the whole class about the math they are learning. Marzano (2007)¹ notes that

initial understanding, albeit a good one, does not suffice for learning that is aimed at long-term retention and use of knowledge. Rather, students must have opportunities to practice new skills and deepen their understanding of new information. Without this type of extended processing, knowledge that students initially understand might fade and be lost over time.

The daily math thinking routines in this book focus on taking Depth of Knowledge (DOK) level 1 activities, to DOK level 2 and 3 activities (Webb, 2005)². Many of the questions are open. For example, we turn the traditional elapsed time question on its head. Instead of asking students “Mark left his house at 3:15 and he came back 20 minutes later. When did he come back?” inspired by Marion Smalls (2009)³ we ask, “An activity takes 20 minutes. When could it have started and when could it have ended?”

In this series, we mainly work on priority standards, although we do address some of the supporting and additional standards. This book is not intended to cover every standard. Rather, it is meant to provide ongoing daily review of the foundational ideas in math. There is a focus for each day of the week.

- ◆ Monday: General Thinking Routines
- ◆ Tuesday: Vocabulary
- ◆ Wednesday: Place Value
- ◆ Thursday: Fluency (American and British Number Talks, Number Strings)
- ◆ Friday: Problem Solving

There are general daily thinking routines (What Doesn't Belong?, True or False?, Convince Me!), that review various priority standards from the different domains (Geometry, Algebraic Thinking, Counting, Measurement, Number Sense). Every Tuesday there is an emphasis on Vocabulary because math is a language and if you don't know the words then you can't speak it. There is a continuous review of foundational words through different games (Tic Tac Toe, Match, Vocabulary Bingo), because students need at least 6 encounters with a word to own it. On Wednesday there is often an emphasis on Place Value. Thursday is always some sort of Fluency routine (American or British Number Talks and Number Strings). Finally, Fridays are Problem Solving routines.

1 Marzano, R. J. (2007). *The art and science of teaching: A comprehensive framework for effective instruction*. ASCD: Virginia.

2 Webb, N. (November, 2005). *Depth-of-knowledge levels for four content areas*. Presentation to the Florida Education Research Association, 50th Annual Meeting, Miami, Florida.

3 Small, M. (2009). *Good questions: Great ways to differentiate mathematics instruction*. Teachers College Press: New York.

The book starts with a review of priority and other second grade standards and then as the weeks progress the current grade level standards are integrated throughout. There is a heavy emphasis on work within 10 and place value within 120. There is also an emphasis on geometry concepts and some data and measurement. The word problem types for third grade have been woven throughout the year.

Throughout the book there is an emphasis on the mathematical practices/processes (SMP, 2010⁴; NCTM, 2000⁵). Students are expected to problem solve in different ways. They are expected to reason by contextualizing and decontextualizing numbers. They are expected to communicate their thinking to partners and the whole group using the precise mathematical vocabulary. Part of this is reading the work of others, listening to others' explanations, writing about their work, and then speaking about their work and the work of others in respectful ways. Students are expected to model their thinking with tools and templates. Students are continuously asked to think about the pattern and structure of numbers as they work through the activities.

These activities focus on building mathematical proficiency as defined by the NAP 2001⁶. These activities focus on conceptual understanding, procedural fluency, adaptive reasoning, strategic competence and a student's mathematical disposition. This book can be used with any math program. These are jump starters to the day. They will get the math muscle moving at the beginning of the day.

Math routines are a form of "guided practice." Marzano notes that although the

guided practice is the place where students—working alone, with other students, or with the teacher—engage in the cognitive processing activities of organizing, reviewing, rehearsing, summarizing, comparing, and contrasting. However, it is important that all students engage in these activities. (p. 7)

These are engaging, standards-based, academically rigorous activities that provide meaningful routines that develop mathematical proficiency. The work can also be used for practice within small groups, workstations and also sent home as questions for homework.

We have focused on coherence from grade to grade, rigor of thinking, and focus on understanding and being able to explain the math the students are doing. We have intended to take deeper dives into the math, not rushing to the topics of the next grade but going deeper into the topics of the grade at hand. Here is our criteria for selecting the routines:

- ◆ Engaging
- ◆ Easy to learn
- ◆ Repeatable
- ◆ Open-ended
- ◆ Easy to differentiate (adapt and extend for different levels).

4 The Standards of Mathematical Practice. "Common Core State Standards for Mathematical Practice." Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010. Retrieved on December 1, 2019 from: www.corestandards.org/Math/Practice.

5 National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: National Council of Teachers of Mathematics.

6 Kilpatrick, J., Swafford, J., and Findell, B. (eds.) (2001). *Adding it up: Helping children learn mathematics*. Washington, DC: National Academy Press.

Figure 1.1 Talking About the Routine!

Monday: Reasoning about Numbers

$$3 + __ = 7$$

Jen said that the answer is 10. Kelly said the answer is 4. Who do you agree with? Why?

Tuesday: Vocabulary Bingo

Look at the 4 words. Decide which one doesn't belong and why. Discuss with a partner.

difference	subtract
addend	take away

Wednesday: Guess My Number

Read the riddle. Think about the clues. Discuss what you think the answer is with a classmate.

I am a 2-digit number.
I am more than 12.
I am less than 20.
My digits add up to 9.
What number am I?

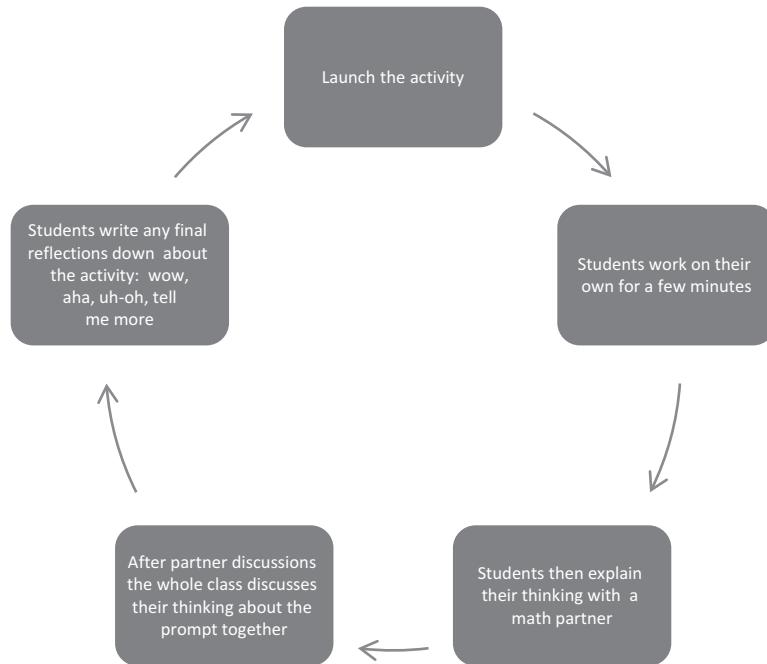
Thursday: Number Strings

$7 + 4$
 $7 + 5$
 $7 + 6$
 $7 + 7$

Friday: Word Problem Fill-in

Mike had _____ marbles. He gave _____ away. How many did he have left?
(4 or 5) (1, 2, or 3)

Figure 1.2 The Math Routine Cycle of Engagement



Step 1: Students are given the launch prompt. The teacher explains the prompt and makes sure that everyone understands what they are working on.

Step 2: They are given a few minutes to work on that prompt by themselves.

Step 3: The next step is for students to work with a math partner. As they work with this partner, students are expected to listen to what their partner did as well as explain their own work.

Step 4: Students come back together as a whole group and discuss the math. They are encouraged to talk about how they solved it and the similarities and differences between their thinking and their partner's thinking.

Step 5: Students reflect on the prompt of the day, thinking about what wowed them, what made them say "Aha," what made them say "Uh-oh," what made them say, "I need to know more about this."

Thinking Activities

These are carefully planned practice activities to get students to think. They are **not meant to be used as a workbook**. This is a thinking activity book. The emphasis is on students doing their own work, explaining what they did with a partner and then sharing out to the entire class.

Routine	Purpose	Description
What's the Story?	This routine focuses on students making sense of numbers.	Students have to look at the model and make up a story that matches it.
Word Problem Sort	In this routine, students are reason about what type of problem they are looking at.	Students sort the problems and decide which one is the designated type that they are looking for.
Word Problem Fill-in	In this routine, students have to fill in numbers and make up and solve their own word problem.	Students fill in the blanks with numbers that they choose and then model and solve the word problem.
Write a Problem	In this routine, students have to write their own problems.	Students have to write problems based on an equation or based on a topic.

Questioning Is the Key

Unlock the Magic of Thinking, You Need Good Questions!

Figure 1.4

<p>Launch Questions (Before the Activity)</p> <ul style="list-style-type: none"> ◆ What is this prompt asking us to do? ◆ How will you start? ◆ What are you thinking? ◆ Explain to your math partner, your understanding of the question. ◆ What will you do to solve this problem? 	<p>Process Questions (During the Activity)</p> <ul style="list-style-type: none"> ◆ What will you do first? ◆ How will you organize your thinking? ◆ What might you do to get started? ◆ What is your strategy? ◆ Why did you ... ? ◆ Why are you doing that? ◆ Is that working? Does it make sense? ◆ Is that a reasonable answer? ◆ Can you prove it? ◆ Are you sure about that answer? ◆ How do you know you are correct?
<p>Debrief Questions (After the Activity)</p> <ul style="list-style-type: none"> ◆ What did you do? ◆ How did you get your answer? ◆ How do you know it is correct? ◆ Can you prove it? ◆ Convince me that you have the correct answer. ◆ Is there another way to think about this problem? 	<p>Partner Questions (Guide Student Conversations)</p> <ul style="list-style-type: none"> ◆ Tell me what you did. ◆ Tell me more about your model. ◆ Tell me more about your drawing. ◆ Tell me more about your calculations. ◆ Tell me more about your thinking. ◆ Can you prove it? ◆ How do you know you are right? ◆ I understand what you did. ◆ I don't understand what you did yet.

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Daily Routines

Week 1 Teacher Notes

Monday: What Doesn't Belong?

When doing What Doesn't Belong?, have the students do the calculations (in their journals, on scratch paper, or on the activity page). Then, have them share their thinking with a friend. Finally, pull them back to the group.

Often students will pick the most obvious difference. For example, they might say $20 - 12$ doesn't belong because it is a subtraction problem. This is true. I would ask them what the difference is between addition and subtraction. I would ask if there are other ways we can think about this first set of numbers. You want someone to say that $6 + 4 + 3$ doesn't belong because the sum is 13.

So, in this routine it is important to also focus on language for the descriptions. The language should be something like: $6 + 4 + 3$ doesn't belong because its sum is 13 and all the other problems have a sum or difference of 12. In Set B, most of the problems are subtraction. Some students will say it's the addition problem. Accept that answer and then look for others. Always validate and affirm what students say. Work it into an ongoing conversation. For example: "Yes that is true. What else might we think about this set?" You want students to be able to say "The difference or the sum to all the other expressions is 15 but for $50 - 25$ the difference is 25. So, the expression $50 - 25$ doesn't belong!"

Tuesday: Vocabulary Match

This Vocabulary Match has many of the second grade words that students should know. Often when reviewing vocabulary it is good to review the grade level words mixed up, meaning not by a specific category. Students should say the word and then find the matching definition. They should have some minutes to do this on their own and then an opportunity to go over their thinking with their math partner. Then, after about 5 minutes, bring them back together as a group and discuss the thinking. Ask students which words were tricky and which ones were easy. Also ask them if there were any that they didn't recognize, that they have never seen before. Have them draw a little sketch by each word to help them remember the word.

Wednesday: Convince Me!

This routine is about getting students to defend and justify their thinking. Be sure to emphasize the language of reasoning. Students should focus on proving it with numbers, words, and pictures. They should say things like:

This is true! I can prove it with ...

This is the difference because ...

I am going to use _____ to show my thinking.

I am going to defend my answer by _____.

I proved my thinking using addition.

*Note: this is the perfect opportunity for students to relate the operations. We always want them thinking about the relationship between the operations.

There are a few tools for students to use but they are in no way limited to those tools.

Thursday: Number Talk

In this Number Talk you want the students to discuss their thinking with strategies and models. Ask students about the strategies that they might use.

Possible responses:

Break apart the tens and the ones and add them.

Give and Take (Compensation) – Take 1 from 28 and give it to 29 to make 30 and 28 becomes 27. Discuss how this makes it a much easier problem when we work with tens.

Friday: What's the Question?

The focus of today is to do a 3 read problem with the students. It is important to read the problem 3 times out loud as a choral read with the students.

First Read: (Stop and visualize! What do you see?) What is this story about? Who is in it? What are they doing?

Second Read: What are the numbers? What do they mean?

Third Read: What are some possible questions we could ask about this story?

Possible questions:

How many marbles does Mary have altogether?

How many fewer red marbles does she have than blue ones?

How many more blue marbles does she have than pink ones?

Does she have more than 20 marbles in total?

How many more pink ones does she need in order to have the same amount of pink as she does red?

How many red and blue marbles does she have in total?

What is the sum of the blue and pink marbles?

*Note: Focus on the vocabulary. Use different words for the sum (altogether, total).

Focus on different types of comparative language so students get comfortable with words and phrases like: "how many more," "how many less," "how many more to get the same amount as," "how many fewer"?

Week 1 Activities

Monday: What Doesn't Belong?

Choose the item that doesn't belong in each set.

A.

$7 + 5$	$20 - 8$
$6 + 4 + 3$	$4 + 4 + 4$

B.

$20 - 5$	$30 - 15$
$5 + 5 + 5$	$50 - 25$

Tuesday: Vocabulary Match

Match the words with the correct definitions.

sum	a 6-sided figure
addend	the answer to an addition problem
centimeter	one of the numbers in an addition equation
difference	the answer to a subtraction problem
hexagon	a small unit of measure

Wednesday: Convince Me!

Prove it with numbers, words, and/or pictures!

$$87 - 25 = 62$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Thursday: Number Talk

What are some ways to think about:

$$29 + 28$$

Friday: What's the Question?

Think of at least 2 questions you could ask about this story. Write them down. Discuss with your classmates.

Mary has 12 red marbles, 14 blue marbles, and 6 pink ones.

1)

2)