CCSS-M K-5
Professional Development
Summer 2014
Getting to Know You

- 3 Interesting Things
- Mix-Freeze-Group
- Three of These Things
Three Interesting Things

• Write your first, last name and grade level at the top of the index card

• Write 3 interesting/important things about yourself.

  (Do NOT share info w/group)

• Pass index card to the front when you’re finished writing.
Mix-Freeze-Group

1. Music starts-Mix around the room and greet all people you see
2. Freeze when music stops
3. Facilitator will ask a question
4. Participants show answer on fingers
5. Participants group according to answer
6. Form groups and prepare to engage
Three of These Things
Cookie Monster’s Sorting Song
Three of These Things
Three of These Things

<table>
<thead>
<tr>
<th>25</th>
<th>26</th>
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<tbody>
<tr>
<td>31</td>
<td>27</td>
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</table>
### Three of These Things

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</table>
Three of These Things: Debrief

- Where’s the math?
- What possible benefits do you see for students to engage in this type of task?
- When might this be a good task to pose to students?
- What Standards for Mathematical Practice are addressed through this activity?
The Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
One of These Things

One of these things is not like the others.
One of these things just doesn’t belong.
Can you tell which thing is not like the others?
By the time I finish my song?

TIME: Around 10 minutes total
(Perfect activity for a number talk or warm up)

TOPIC: The possibilities are endless...
(numbers, shapes, object size/color/use, synonyms, etc.)

LANGUAGE: SWBAT orally explain how the number/object/word is different from the rest.

OBJECTIVE: Content: SWBAT identify the number/object/word that is different from the rest.

MATERIALS: 2-day-2 grid * chart paper * markers

ACTIVITY:
1. Explain to students that they will be shown a group of numbers/words/items and that they need to decide which one is different from the rest in some way. Let students know once the grid is up, there will be one minute of silence for everyone to find their “one thing” and come up with their reasoning.
   **TIP:** As you see students finishing up their thinking process before the minute is up, challenge them to find another number/word/item that could be the one that does not belong and think about why.**

2. Display the grid and give the students a minute of silence to look over the items and really think about the relationships between them. When a minute is up, give partners/models a minute or two to discuss their “one thing” and the reasoning behind choosing that item.

3. Pull the class back together and have individuals share out their “one thing” and reasoning. Record the number/word/item on a blank chart paper, as well as the reasoning.
   **TIP:** Be sure to ask questions like: “Can someone else explain ____’s reason in another way?” “Can you explain your thinking to me?” – don’t accept almost-right answers. “I like what you’ve said so far. Can someone add to that?”

4. Ask students what relationships they see between the reasoning given by the class, i.e. the rest of the numbers have a 0 in the one’s place and the rest of the digits are even.

INSTRUCTIONAL IMPLICATIONS:

<table>
<thead>
<tr>
<th>One of These Things</th>
<th>One of These Things</th>
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</thead>
<tbody>
<tr>
<td>7/8</td>
<td>4/5</td>
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<tr>
<td>4/12</td>
<td>9/11</td>
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<table>
<thead>
<tr>
<th>One of These Things</th>
<th>One of These Things</th>
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<tbody>
<tr>
<td>350</td>
<td>3500</td>
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<tr>
<td>5/10</td>
<td>3/6</td>
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</table>

<table>
<thead>
<tr>
<th>One of These Things</th>
<th>One of These Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>300</td>
</tr>
<tr>
<td>1/2</td>
<td>2/8</td>
</tr>
</tbody>
</table>
Your Turn…

• Now it is your turn to think about what types of One of These Things activities you would like to pose to your students.

• Create some of your own!

• Put an idea on a post-it note and place on chart paper.
## Today’s Agenda

- Three of These Things
- Common Core Overview
- Introduction to CGI
  - Research Problems
  - Problem Types
- Single Digit Strategy Development
- Reflection
Day 2 Agenda

- Single Digit Trajectory Review
- Math Game: Double Compare
- Multi-Digit Strategies
- Unpacking Problems
- Choral Counting
- Reflection
A Look Inside the CCSS for Mathematics
# CCSS Domain Progression

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<tbody>
<tr>
<td>K</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>HS</td>
<td>K</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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</tbody>
</table>

- **Operations and Algebraic Thinking**
- **Geometry**
- **Measurement and Data**
- **Statistics and Probability**
- **Number and Operations in Base Ten**
- **Number and Operations – Fractions**
- **Ratios and Proportional Relationships**
- **The Number System**
- **Number & Quantity**
- **Expressions and Equations**
- **Algebra**
- **Functions**
- **Geometry**
- **Statistics & Probability**
David Coleman
Three Shifts of the Common Core in Mathematics

• **Focus** strongly where the standards focus

• **Coherence**: Think across grades and link to major topics within grades

• **Rigor**: In major topics, pursue:
  - Conceptual understanding,
  - Procedural skill and fluency, and
  - Application

with equal intensity
<table>
<thead>
<tr>
<th>Grade</th>
<th>Focus Areas in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td><strong>Addition and subtraction concepts, skills, and problem solving, and place value</strong></td>
</tr>
<tr>
<td>3-5</td>
<td><strong>Multiplication and division of whole numbers and fractions concepts, skills, and problem solving</strong></td>
</tr>
<tr>
<td>6</td>
<td><strong>Ratios and proportional reasoning; early expressions and equations</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>Ratios and proportional reasoning; arithmetic of rational numbers</strong></td>
</tr>
<tr>
<td>8</td>
<td><strong>Linear algebra and linear functions</strong></td>
</tr>
</tbody>
</table>
### Required Fluencies in K-6

<table>
<thead>
<tr>
<th>Grade</th>
<th>Standard</th>
<th>Required Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>K.OA.5</td>
<td>Add/subtract within 5</td>
</tr>
<tr>
<td>1</td>
<td>1.OA.6</td>
<td>Add/subtract within 10</td>
</tr>
<tr>
<td>2</td>
<td>2.OA.2</td>
<td>Add/subtract within 20</td>
</tr>
<tr>
<td></td>
<td>2.NBT.5</td>
<td>Add/subtract within 100</td>
</tr>
<tr>
<td>3</td>
<td>3.OA.7</td>
<td>Multiply/divide within 100</td>
</tr>
<tr>
<td></td>
<td>3.NBT.2</td>
<td>Add/subtract within 1000</td>
</tr>
<tr>
<td>4</td>
<td>4.NBT.4</td>
<td>Add/subtract within 1,000,000</td>
</tr>
<tr>
<td>5</td>
<td>5.NBT.5</td>
<td>Multi-digit multiplication</td>
</tr>
<tr>
<td>6</td>
<td>6.NS.2,3</td>
<td>Multi-digit division</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi-digit decimal operations</td>
</tr>
</tbody>
</table>
What is meant by fluent?

- **Efficient** – a reasonable amount of steps
- **Accurate** – the solution has a degree of precision appropriate for the problem context. The student knows why the solution works.
- **Flexible** – the student knows several strategies
  - 9 x 6 is 54 because…
    - 6 x 10 is 60, take away one group of 6 and it is 54
    - 5 x 6 is 30, 4 x 6 is 24, 30 + 24 is 54
    - 9 x 3 is 27, double that 20 + 20 is 40, 7 + 7 is 14, 40 + 14 is 54
Grade Level Introduction

Mathematics | Grade 2

In Grade 2, instructional time should focus on four critical areas.
(1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

(1) Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

(2) Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000
Grade Level Overview

Grade 2 Overview

Operations and Algebraic Thinking
- Represent and solve problems involving addition and subtraction.
- Add and subtract within 20.
- Work with equal groups of objects to gain foundations for multiplication.

Number and Operations in Base Ten
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data
- Measure and estimate lengths in standard units.
- Relate addition and subtraction to length.
- Work with time and money.
- Represent and interpret data.

Mathematical Practices
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Geometry
- Reason with shapes and their attributes.
Format of K-8 Standards

Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.¹

Add and subtract within 20.

2. Fluently add and subtract within 20 using mental strategies.² By end of Grade 2, know from memory all sums of two one-digit numbers.

Work with equal groups of objects to gain foundations for multiplication.

3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
Everyone, please stand up.

- The facilitator will read the statements on a given card.
- If the statement pertains to you or is true for you, remain standing. If the statement is not true for you, sit down and remain seated.
Directions: Rank these problems from easiest to most difficult.

A. Carla has 7 dollars. How many more dollars does she have to earn so that she will have 11 dollars to buy a puppy?

B. Mr. Gomez had 20 cupcakes. He put the cupcakes into 4 boxes so that there were the same number of cupcakes in each box. How many cupcakes did Mr. Gomez put in each box?

C. Paco had 13 cookies. He ate 6 of them. How many cookies does Paco have left?

D. Tad had 15 guppies. He put 3 guppies in each jar. How many jars did Tad put guppies in?

E. Robin has 3 packages of gum. There are 6 pieces of gum in each package. How many pieces of gum does Robin have altogether?

F. Hannah has 12 balloons. Jacob has 7 balloons. How many more balloons does Hannah have than Jacob?
Kindergarten Problems

- Work through these items, trying to identify ways that young children might solve these problems.
- Note strategies you used to share later.
- Individually rank the problems from easiest (1) to most difficult (6) to solve.
- Rank as a group – come to a consensus on disagreements.
A. Carla has 7 dollars. How many more dollars does she have to earn so that she will have 11 dollars to buy a puppy?  
80% Ranking: 3

B. Mr. Gomez had 20 cupcakes. He put the cupcakes into 4 boxes so that there were the same number of cupcakes in each box. How many cupcakes did Mr. Gomez put in each box?  
70% Ranking: 6

C. Paco had 13 cookies. He ate 6 of them. How many cookies does Paco have left?  
88.6% Ranking: 1

D. Tad had 15 guppies. He put 3 guppies in each jar. How many jars did Tad put guppies in?  
74.3% Ranking: 4

E. Robin has 3 packages of gum. There are 6 pieces of gum in each package. How many pieces of gum does Robin have altogether?  
87.1% Ranking: 2

F. Hannah has 12 balloons. Jacob has 7 balloons. How many more balloons does Hannah have than Jacob?  
72.9% Ranking: 5
Dialogue

- Take a moment to talk to someone next to you about what you noticed about the difficulty of the problems and the rankings.

- Be prepared to share one of your ideas.
While watching the video, pay attention to:
- Student strategies for solving
- What might you do as a teacher to help this student develop more sophisticated or efficient problem solving strategies?

Talk to a partner about what you noticed in the video. Did anything surprise you? What questions might you have?
## Classification of Word Problems

<table>
<thead>
<tr>
<th>PROBLEM TYPE</th>
<th>RESULT UNKNOWN</th>
<th>CHANGE UNKNOWN</th>
<th>START UNKNOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Join</strong></td>
<td>Keisha had 5 M&amp;M’s. Tomas have her 8 more M&amp;M’s. How many M&amp;M’s does Keisha have now?</td>
<td>Keisha had 5 M&amp;M’s. Tomas gave her some more. Now she has 13 M&amp;M’s. How many did Tomas give her?</td>
<td>Keisha had some M&amp;M’s. Tomas gave her 5 more M&amp;M’s. Now she has 13 M&amp;M’s. How many M&amp;M’s did Keisha have to start with?</td>
</tr>
<tr>
<td><strong>Separate</strong></td>
<td>Keisha had 13 M&amp;M’s. She gave 5 M&amp;M’s to Tomas. How many M&amp;M’s does she have left?</td>
<td>Keisha had 13 M&amp;M’s. She gave some to Tomas. Now she has 5 M&amp;M’s left. How many M&amp;M’s did Keisha give to Tomas?</td>
<td>Keisha had some M&amp;M’s. She gave 5 to Tomas. Now she has 8 M&amp;M’s left. How many M&amp;M’s did Keisha have to start with?</td>
</tr>
<tr>
<td><strong>Whole Unknown</strong></td>
<td>Keisha has 5 red M&amp;M’s and 8 green M&amp;M’s. How many M&amp;M’s does she have?</td>
<td>Keisha has 13 M&amp;M’s. Five are red and the rest are green. How many green M&amp;M’s does Keisha have?</td>
<td></td>
</tr>
<tr>
<td><strong>Part-Part-Whole</strong></td>
<td>Keisha has 13 M&amp;M’s. Tomas has 5 M&amp;M’s. How many more M&amp;M’s does Keisha have than Tomas?</td>
<td>Keisha has 5 M&amp;M’s. Keisha has 8 more M&amp;M’s than Tomas. How many M&amp;M’s does Keisha have?</td>
<td>Keisha has 13 M&amp;M’s. She has 5 more than Tomas. How many M&amp;M’s does Tomas have?</td>
</tr>
<tr>
<td><strong>Compare</strong></td>
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</table>
Classification of Word Problems

- Not all addition and subtraction problems are the same. What are some of the distinguishing factors that relate to the difficulty in solving various problems?
  - Location of the unknown variable
  - The types of actions or relationships described in the problem
Children’s Solution Strategies

- Direct Modeling
- Counting Strategies
- Derived Facts
- Recall/Number Facts
Oliver has 5 toy cars. His sister gives him 8 more toy cars for his birthday. How many toy cars does Oliver have now?

- Please solve this problem in at least two different ways.
- Compare your solution strategies with colleagues at your table.
Single Digit Strategy
Development continued

- With a partner create a story that corresponds to this number sentence.

  \[ 7 + \_\_\_ = 15 \]

- Solve this problem in at least two different ways. Write one solution on one post-it note. Use a different post-it note for each solution.
Sorting Problem Solving Strategies

- Work with the people at your table to group your solution strategies along the problem solving trajectory.
  - Which solutions fall under what categories?
  - What are some similarities and differences amongst the solution strategies you generated?
  - What questions might this raise for you?
Problem Solving Trajectory

• In looking at multiple solution strategies from this perspective,
  • What has this caused you to think about?
  • How might you be able to use what we have talked about to help guide decision-making in your classroom?
  • What questions might you have?
Big Ideas - Reflection

- Jot down 2-3 Big Ideas for you today.

- What has today caused you to think about in your own teaching practice?

- How might you use what we talked about to help guide decision-making in your classroom?