Arizona Mathematic Standards

Mathematics Curriculum Map

First Grade

ARIZONA DEPARTMENT OF EDUCATION
HIGH ACADEMIC STANDARDS

Chandler Unified School District Standards

First Grade – At a Glance

Curriculum Map

Quarter 1	Quarter 2	Quarter 3	Quarter 4
Operations & Algebraic Thinking	**Operations & Algebraic Thinking** **Number & Operations in Base Ten**	**Number & Operations in Base Ten** **Measurement and Data**	**Measurement and Data** **Geometry**
1.OA.A.1 1.OA.B.3 1.OA.D.7 1.OA.D.8 1.OA.C.6 (Fluency Standard)	1.OA.A.1 1.OA.A.2 1.OA.B.3 1.OA.B.4 1.OA.C.5 1.NBT.A.1 1.NBT.B.2 1.NBT.B.3 (Go Math) 1.OA.C.6 (Fluency Standard)	1.NBT.A.1 (My Math) 1.NBT.B.3 1.NBT.C.4 1.NBT.C.5 1.NBT.C.6 1.MD.A.1 1.MD.A.2 1.MD.B.3a 1.OA.C.6 (Fluency Standard)	1.MD.B.3b 1.MD.C.4 1.G.A.1 1.G.A.2 1.G.A.3 1.OA.C.6 (Fluency Standard)

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.

All quarters will include the Mathematical Practices

NOTE: Mathematical practices are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

Grade 1 Key: OA = Operations and Algebraic Thinking, NBT = Number and Operations in Base Ten, MD = Measurement and Data, G = Geometry

First Grade Overview

Operations and Algebraic Thinking (OA)

- Represent and solve problems involving addition and subtraction.
- Understand and apply properties of operations and the relationship between addition and subtraction.
- Add and subtract within 10.
- Work with addition and subtraction equations.

Number and Operations in Base Ten (NBT)

- Extend the counting sequence.
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data (MD)

- Measure lengths indirectly and by iterating length units.
- Work with time and money.
- Represent and interpret data.

Geometry (G)

- Reason with shapes and their attributes.

Standards for Mathematical Practices (MP)

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.

First Grade Content Emphasis

First Grade Content Emphasis	
Operations and Algebraic Thinking (OA)	
●	Represent and solve problems involving addition and subtraction.
●	Understand and apply properties of operations and the relationship between addition and subtraction.
●	Add and subtract within 20.
●	Work with addition and subtraction equations.
Number and Operations in Base Ten (NBT)	
●	Extend the counting sequence.
●	Understand place value.
●	Use place value understanding and properties to add and subtract.
Measurement and Data (MD)	
●	Measure lengths indirectly and by iterating length units.
▲	Work with time and money.
▲	Represent and interpret data.
Geometry (G)	
▲	Reason with shapes and their attributes.
● -Major Content ▲ -Supporting Content	
Major content (●) from the content emphasis section should account for approximately 70% of instructional time.	

Quarter 1

Essential Question(s):

- **How can you model adding within 10?**
- **How can you subtract numbers from 10 or less?**
- **How can relating addition and subtraction help you learn and understand facts within 20?**

80% of instructional time should be based on core materials (My Math, Go Math, Saxon); 20% may be based on additional resources.

Topic	Arizona Mathematics Standards	Resources
Fluency Standard	*To be taught throughout the year:* 1.OA.C.6 Fluently add and subtract within 10.	
Addition Concepts	1.OA.A.1 Use addition and subtraction within 20 to solve word problems with unknowns in all positions (e.g., by using objects, drawings, and/or equations with a symbol for the unknown number to represent the problem). *See Table 1.* 1.OA.B.3 Apply properties of operations (commutative and associative properties of addition) as strategies to add and subtract within 20. (Students need not use formal terms for these properties.) 1.OA.C.6 Fluently add and subtract within 10.	Go Math Chapter 1 **Additional Resources:** EngageNY Module 1 Topic A Topic B Topic C Topic D Topic E Topic F Illustrative Mathematics 1.OA.A.1 Tasks 1.OA.B.3 Tasks 1.OA.C.6 Tasks Georgia Standards – Unit 3 Inside Mathematics 1st Grade OA Tasks

Quarter 1

Essential Question(s):

- **How can you model adding within 10?**
- **How can you subtract numbers from 10 or less?**
- **How can relating addition and subtraction help you learn and understand facts within 20?**

Subtraction Concepts	1.OA.A.1 Use addition and subtraction within 20 to solve word problems with unknowns in all positions (e.g., by using objects, drawings, and/or equations with a symbol for the unknown number to represent the problem). *See Table 1.* 1.OA.C.6 Fluently add and subtract within 10. 1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers (e.g., determine the unknown number that makes the equation true in each of the equations 8 + □ = 11, 5 = □ - 3, 6 + 6 = □).	Go Math Chapter 2 **Additional Resources:** EngageNY Module 1 Topic G Topic H Topic I Topic J Illustrative Mathematics 1.OA.A.1 Tasks 1.OA.C.6 Tasks 1.OA.D.8 Tasks Georgia Standards – Unit 3 Inside Mathematics 1st Grade OA Tasks
Addition and Subtraction Relationships	1.OA.A.1 Use addition and subtraction within 20 to solve word problems with unknowns in all positions (e.g., by using objects, drawings, and/or equations with a symbol for the unknown number to represent the problem). *See Table 1.* 1.OA.C.6 Fluently add and subtract within 10. 1.OA.D.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false (e.g., Which of the following equations are true and which are false? 6 + 1 = 6 - 1, 7 = 8 - 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2). 1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers (e.g., determine the unknown number that makes the equation true in each of the equations 8 + □ = 11, 5 = □ - 3, 6 + 6 = □).	Go Math Chapter 5 **Additional Resources:** Illustrative Mathematics 1.OA.A.1 Tasks 1.OA.C.6 Tasks 1.OA.D.7 Tasks 1.OA.D.8 Tasks Georgia Standards – Unit 3 Inside Mathematics 1st Grade OA Tasks

***The Standards for Mathematical Practices are to be embedded throughout every chapter.**

Quarter 2

Essential Question(s):

- **How do you solve addition problems?**
- **How do you solve subtraction problems?**
- **How do you use place value to model, read, and write numbers to 20?**

80% of instructional time should be based on core materials (My Math, Go Math, Saxon); 20% may be based on additional resources.

Topic	Arizona Mathematics Standards	Resources
Fluency Standard	*To be taught throughout the year:* 1.OA.C.6 Fluently add and subtract within 10.	
Addition Strategies	1.OA.A.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (e.g., by using objects, drawings, and/or equations with a symbol for the unknown number to represent the problem). *See Table 1.* 1.OA.B.3 Apply properties of operations (commutative and associative properties of addition) as strategies to add and subtract within 20. (Students need not use formal terms for these properties.) 1.OA.C.6 Fluently add and subtract within 10.	Go Math Chapter 3 **Additional Resources:** EngageNY Module 4 Topic E Topic F Illustrative Mathematics 1.OA.A.2 Tasks 1.OA.B.3 Tasks 1.OA.C.6 Tasks Georgia Standards – Unit 3 Inside Mathematics 1st Grade OA Tasks
Subtraction Strategies	1.OA.A.1 Use addition and subtraction within 20 to solve word problems with unknowns in all positions (e.g., by using objects, drawings, and/or equations with a symbol for the unknown number to represent the problem). *See Table 1.* 1.OA.B.4 Understand subtraction as an unknown-addend problem within 20 (e.g., subtract 10 - 8 by finding the number that makes 10 when added to 8). 1.OA.C.5 Relate counting to addition and subtraction (e.g., by using counting on 2 to add 2). 1.OA.C.6 Fluently add and subtract within 10.	Go Math Chapter 4 **Additional Resources:** EngageNY Module 4 Topic E Topic F Illustrative Mathematics 1.OA.A.1 Tasks 1.OA.B.4 Tasks 1.OA.C.5 Tasks 1.OA.C.6 Tasks

Quarter 2

Essential Question(s):

- **How do you solve addition problems?**
- **How do you solve subtraction problems?**
- **How do you use place value to model, read, and write numbers to 20?**

Subtraction Strategies Continued		Georgia Standards – Unit 3 Inside Mathematics 1st Grade OA Tasks
Count and Model Numbers	1.NBT.A.1 Count to 120 by 1's, 2's, and 10's starting at any number less than 100. In this range, read and write numerals and represent a number of objects with a written numeral. 1.NBT.B.2 Understand that the two digits of a two-digit number represent groups of tens and ones. Understand the following as special cases: a. 10 can be thought of as a group of ten ones — called a "ten". b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). 1.NBT.B.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	Go Math Chapter 6 **Additional Resources:** EngageNy Module 2 Topic D Module 4 Topic A Module 6 Topic B Illustrative Mathematics 1.NBT.A.1 Tasks 1.NBT.B.2 Tasks 1.NBT.B.3 Tasks Georgia Standards – Unit 1 Georgia Standards – Unit 2 Inside Mathematics 1st Grade NBT Tasks

***The Standards for Mathematical Practices are to be embedded throughout every chapter.**

Quarter 3

Essential Question(s):

- **How do you use plave value to compare numbers?**
- **How can you add and subtract two-digit numbers?**
- **How can you measure length and tell time?**

80% of instructional time should be based on core materials (My Math, Go Math, Saxon); 20% may be based on additional resources.

Topic	Arizona Mathematics Standards	Resources
Fluency Standard	*To be taught throughout the year:* 1.OA.C.6 Fluently add and subtract within 10.	
Compare Numbers	1.NBT.B.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <. 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count.	Go Math Chapter 7 **Additional Resources:** EngageNY Module 6 Topic C Topic D Illustrative Mathematics 1.NBT.B.3 Tasks 1.NBT.C.5 Tasks Georgia Standards – Unit 1 Georgia Standards – Unit 2 Inside Mathematics 1st Grade NBT Tasks
Two-Digit Addition and Subtraction	1.OA.C.6 Fluently add and subtract within 10. 1.NBT.C.4 Demonstrate understanding of addition within 100, connecting objects or drawings to strategies based on place value (including multiples of 10), properties of operations, and/or the relationship between addition and subtraction. Relate the strategy to a written form. *See Table 1.* 1.NBT.C.6 Subtract multiples of 10 in the range of 10 to 90 (positive or zero differences), using objects or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Relate the strategy to a written form.	Go Math Chapter 8 **Additional Resources:** EngageNY Module 4 Topic C Topic D Illustrative Mathematics 1.NBT.C.4 Tasks Georgia Standards – Unit 1 Georgia Standards – Unit 2 Inside Mathematics 1st Grade NBT Tasks

Quarter 3

Essential Question(s):

- **How do you use plave value to compare numbers?**
- **How can you add and subtract two-digit numbers?**
- **How can you measure length and tell time?**

Measurement	1.MD.A.1 Order three objects by length. Compare the lengths of two objects indirectly by using a third object. 1.MD.A.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.) 1.MD.B.3a Tell and write time in hours and half-hours using analog and digital clocks.	Go Math Chapter 9 **Additional Resources:** EngageNY Module 3 Topic A Topic B Topic C Module 5 Topic D Illustrative Mathematics 1.MD.A.2 Tasks Georgia Standards – Unit 4 Inside Mathematics 1st Grade MD Tasks

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Quarter 4

Essential Question(s):

- **How can graphs and charts help you organize, represent, and interpret data?**
- **How do you identify and describe three-dimensional shapes?**
- **How do you sort and describe two-dimensional shapes?**

80% of instructional time should be based on core materials (My Math, Go Math, Saxon); 20% may be based on additional resources.

Topic	Arizona Mathematics Standards	Resources
Fluency Standard	*To be taught throughout the year:* 1.OA.C.6 Fluently add and subtract within 10.	
Represent Data	1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	Go Math Chapter 10 **Additional Resources:** EngageNY Module 3 Topic D Illustrative Mathematics 1.MD.C.4 Tasks Georgia Standards – Unit 4 Inside Mathematics 1st Grade MD Tasks
Three-Dimensional Geometry	1.G.A.1 Distinguish between defining attributes (triangles are closed and 3 sided) versus non-defining attributes (color, orientation, overall size) for two-dimensional shapes; build and draw shapes that possess defining attributes. 1.G.A.2 Compose two-dimensional shapes or three-dimensional shapes to create a composite shape.	Go Math Chapter 11 **Additional Resources:** Illustrative Mathematics 1.G.A.1 Tasks 1.G.A.2 Tasks Georgia Standards – Unit 6 Inside Mathematics 1st Grade G Tasks

Quarter 4

Essential Question(s):

- **How can graphs and charts help you organize, represent, and interpret data?**
- **How do you identify and describe three-dimensional shapes?**
- **How do you sort and describe two-dimensional shapes?**

Two-Dimensional Geometry	1.G.A.1 Distinguish between defining attributes (triangles are closed and 3 sided) versus non-defining attributes (color, orientation, overall size) for two-dimensional shapes; build and draw shapes that possess defining attributes. 1.G.A.2 Compose two-dimensional shapes or three-dimensional shapes to create a composite shape. 1.G.A.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters. Describe the whole as two of, or four of the shares. Understand that decomposing into more equal shares creates smaller shares.	Go Math Chapter 12 **Additional Resources:** EngageNY Module 5 Topic A Topic B Topic C Illustrative Mathematics 1.G.A.1 Tasks 1.G.A.2 Tasks 1.G.A.3 Tasks Georgia Standards – Unit 6 Inside Mathematics 1st Grade G Tasks
*Standards to Supplement	1.MD.B.3b Identify coins by name and value (pennies, nickels, dimes and quarters).	Supplemental Resources: EngageNY Module 6 Topic E

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The Mathematical Practices: Narratives and Questions

Mathematics Practices		Narratives	Related Questions
Overarching habits of mind of a productive math thinker	**4.MP.1 Make sense of problems and persevere in solving them**	Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, “Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.	• How would you describe the problem in your own words? • How would you describe what you are trying to find? • What do you notice about...? • What information is given in the problem? • Describe the relationship between the quantities. • Describe what you have already tried. What might you change? • Talk me through the steps you’ve used to this point. • What steps in the process are you most confident about? • What are some other strategies you might try? • What are some other problems that are similar to this one? • How might you use one of your previous problems to help you begin? • How else might you organize...represent... show...?
	4.MP.6 Attend to precision	Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.	• What mathematical terms apply in this situation? • How did you know your solution was reasonable? • Explain how you might show that your solution answers the problem. • What would be a more efficient strategy? • How are you showing the meaning of the quantities? • What symbols or mathematical notations are important in this problem? • What mathematical language...,definitions..., properties can you use to explain...? • How could you test your solution to see if it answers the problem?

Actions and dispositions from NCSM Summer Leadership Academy, Atlanta, GA • Draft, June 22, 2011)

Most questions from all Grades Common Core State Standards Flip Book

The Mathematical Practices: Narratives and Questions

Mathematics Practices		Narratives	Related Questions
Reasoning and Explaining	**4.MP.2 Reason abstractly and quantitatively**	Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.	• What do the numbers used in the problem represent? • What is the relationship of the quantities? • How is _____ related to _____? • What is the relationship between _____and _____? • What does_____mean to you? (e.g. symbol, quantity, diagram) • What properties might we use to find a solution? • How did you decide in this task that you needed to use...? • Could we have used another operation or property to solve this task? Why or why not?
	4.MP.3 Construct viable arguments and critique the reasoning of others	Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.	• What mathematical evidence would support your solution? • How can we be sure that...? / How could you prove that...? • Will it still work if...? • What were you considering when...? • How did you decide to try that strategy? • How did you test whether your approach worked? • How did you decide what the problem was asking you to find? • Did you try a method that did not work? Why didn't it work? Could it work? • What is the same and what is different about...? • How could you demonstrate a counter-example?

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The Mathematical Practices: Narratives and Questions

Mathematics Practices		Narratives	Related Questions
Modeling and Using Tools	**4.MP.4 Model with mathematics**	Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	• What number model could you construct to represent the problem? • What are some ways to represent the quantities? • What is an equation or expression that matches the diagram, number line, chart, table, and your actions with the manipulatives? • Where did you see one of the quantities in the task in your equation or expression? What does each number in the equation mean? • How would it help to create a diagram, graph, table...? • What are some ways to visually represent...? • What formula might apply in this situation?
	4.MP.5 Use appropriate tools strategically	Mathematically proficient students consider available tools when solving a mathematical problem. They choose tools that are relevant and useful to the problem at hand. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Students deepen their understanding of mathematical concepts when using tools to visualize, explore, compare, communicate, make and test predictions, and understand the thinking of others.	• What mathematical tools can we use to visualize and represent the situation? • Which tool is more efficient? Why do you think so? • What information do you have? • What do you know that is not stated in the problem? • What approach are you considering trying first? • What estimate did you make for the solution? • In this situation would it be helpful to use...a graph..., number line..., ruler..., diagram..., calculator..., manipulative? • Why was it helpful to use...? • What can using a _____ show us that _____may not? • In what situations might it be more informative or helpful to use...?

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The Mathematical Practices: Narratives and Questions

Mathematics Practices		Narratives	Related Questions
Seeing structure and generalizing	**4.MP.7 Look for and make use of structure**	Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.	• What observations do you make about...? • What do you notice when...? • What parts of the problem might you eliminate..., simplify...? • What patterns do you find in...? • How do you know if something is a pattern? • What ideas that we have learned before were useful in solving this problem? • What are some other problems that are similar to this one? • How does this relate to...? • In what ways does this problem connect to other mathematical concepts?
	4.MP.8 Look for and express regularity in repeated reasoning	Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.	• Explain how this strategy works in other situations? • Is this always true, sometimes true or never true? • How would we prove that...? • What do you notice about...? • What is happening in this situation? • What would happen if...? • Is there a mathematical rule for...? • What predictions or generalizations can this pattern support? • What mathematical consistencies do you notice?

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Table 1. Common Addition and Subtraction Problem Types/Situations. [1]

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 - ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[2]**
Put together/Take Apart[3]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?"): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has three fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

[1] Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

[2] These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children that the = sign does not always mean **makes** or **results in** but always does mean **is the same quantity as.**

[3] Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of the basic situation, especially for small numbers less than or equal to 10.

Table 2. Common Multiplication and Division Situations. [7]

	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	3 x 6 = ?	**3 x ? = 18, and 18 ÷ 3 = ?**	**? x 6 = 18, and 18 ÷ 6 = ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurements example:* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example:* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example:* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays [4]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example:* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example:* A rectangle has the area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example:* A rectangle has the area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare (Grade 4 ONLY)	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example:* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example:* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example:* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	a x b = ?	a x ? = p, and p ÷ a = ?	? x b = p, and p ÷ b = ?

[7] The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

[4] The language is the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.