Grade 1 Overview

In Grade 1, instructional time should focus on three areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; and (3) developing understanding of linear measurement and measuring lengths as iterating length units. Please note that while every standard/topic in the grade level has not been included in this overview, all standards should be included in instruction.

1. Through their learning in the ***Operations and Algebraic Thinking*** domain, students:
   - develop strategies for adding and subtracting whole numbers based on their prior work with small numbers;
   - use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations;
   - understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two);
   - use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20; and
   - build their understanding of the relationship between addition and subtraction by comparing a variety of solution strategies.
2. Through their learning in the ***Number and Operations in Base Ten*** domain, students:
   - develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10;
   - compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes;
   - think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones); and
   - understand the order of the counting numbers and their relative magnitudes through activities that build number sense.
3. Through their learning in the ***Measurement and Data*** domain, students:
   - develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.*

   *Note: Students should apply the transitivity principle of indirect measurement to make comparisons, but they need not use this technical term.

Mathematical Practices

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

NY-1.OA Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 20 to solve one step word problems involving situations of adding to, taking from, putting together, taking apart, and/or comparing, with unknowns in all positions.

   Note: Problems should be *represented* using objects, drawings, *and* equations with a symbol for the unknown number. Problems should be *solved* using objects *or* drawings, and equations.

Coherence: NY-K.OA.2 → NY-1.OA.1 → NY-2.OA.1

In the chart below, the four unshaded (white) subtypes are mastered in Kindergarten. Grade 1 and 2 students work with all subtypes. *Darker shading indicates the four difficult subtypes that students should work with in Grade 1 but need not master until Grade 2.*

Common Addition and Subtraction Situations

	Result Unknown	Change Unknown	Start Unknown
Add To	*A* bunnies sat on the grass. *B* more bunnies hopped there. How many bunnies are on the grass now? $A + B = \square$	*A* bunnies were on the grass. Some more bunnies hopped there. Then there were *C* bunnies. How many bunnies hopped over to the first *A* bunnies? $A + \square = C$	Some bunnies were sitting on the grass. *B* more bunnies hopped there. Then there were *C* bunnies. How many bunnies were on the grass before? $\square + B = C$
Take From	*C* apples were on the table. I ate *B* apples. How many apples are on the table now? $C - B = \square$	*C* apples were on the table. I ate some apples. Then there were *A* apples. How many apples did I eat? $C - \square = A$	Some apples were on the table. I ate *B* apples. Then there were *A* apples. How many apples were on the table before? $\square - B = A$
	Total Unknown	**Both Addends Unknown**	**Addend Unknown**
Put Together/ Take Apart	*A* red apples and *B* green apples are on the table. How many apples are on the table? $A + B = \square$	Grandma has *C* flowers. How many can she put in her red vase and how many in her blue vase? $C = \square + \square$	*C* apples are on the table. *A* are red and the rest are green. How many apples are green? $A + \square = C$ $C - A = \square$
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare	*"How many more?" version:* Lucy has *A* apples. Julie has *C* apples. How many more apples does Julie have than Lucy?	*Version with "More":* Julie has *B* more apples than Lucy. Lucy has *A* apples. How many apples does Julie have?	*Version with "More":* Julie has *B* more apples than Lucy. Julie has *C* apples. How many apples does Lucy have?
Compare	*"How many fewer?" version:* Lucy has *A* apples. Julie has *C* apples. How many fewer apples does Lucy have than Julie? $A + \square = C$ $C - A = \square$	*Version with "Fewer":* Lucy has *B* fewer apples than Julie. Lucy has *A* apples. How many apples does Julie have? $A + B = \square$	*Version with "Fewer":* Lucy has *B* fewer apples than Julie. Julie has *C* apples. How many apples does Lucy have? $C - B = \square$ $\square + B = C$

2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.

Coherence: NY-1.OA.2 → NY-2.NBT.6

e.g. by using objects, drawings, and equations with a symbol for the unknown number to represent the problem

Note on Manipulatives in Grades K-2:

- A note on manipulatives in grades K–2: Manipulatives such as physical models of hundreds, tens, and ones, and visual models such as math drawings, are important parts of the K–2 classroom. These manipulatives and visual models should always be connected to written symbols and methods.[9]

NY-1.OA	Operations and Algebraic Thinking
Understand and apply properties of operations and the relationship between addition and subtraction.	
3. Apply properties of operations as strategies to add and subtract. Note: Students need not use formal terms for these properties.	Coherence: NY-1.OA.3 → NY-2.NBT.9 e.g., • If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) • To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)
4. Understand subtraction as an unknown-addend problem within 20.	Coherence: NY-1.OA.4 → NY-2.NBT.9 e.g., Subtract 10 – 8 by finding the number that makes 10 when added to 8.

Within-Grade Connections:

- When students use the *making ten* strategy (NY-1.OA.6), they are applying the Associative property of addition (NY-1.OA.3).[(9)]
  For example, when solving 8 + 3 by "making a ten," a student decomposes the 3 into 2 + 1 in order to re-associate the 2 with the 8, making ten + 1.
  8 + 3
  8 + (2 + 1)
  (8 + 2) + 1

Connecting the Standards for Mathematical Practice to Mathematical Content:

- All work with properties (NY-1.OA.3) and place value (e.g., NY-1.NBT.2 & 4) should be seen as an investigation and use of the structure of the number system and of arithmetic (MP.7). Students' explanations of the properties and reasoning that they used in these contexts are early beginnings of the construction of (brief) logical arguments (MP.3). Examples of brief but excellent arguments at this grade level could include:
  - I know that 7 – 3 equals 4 because 4 + 3 equals 7. (This shows NY-1.OA.4 being met.)
  - I knew that 8 + 8 = 20 was wrong because 10 + 10 equals 20 and 8 is less than 10.
  - I know that 8 + 7 equals 15 because I know that 8 + 8 equals 16. [(9)]

NY-1.OA Operations and Algebraic Thinking

Add and subtract within 20.

5. Relate counting to addition and subtraction.

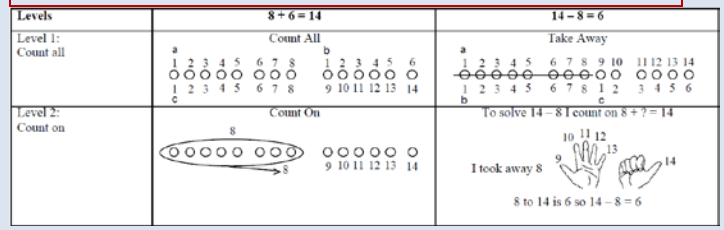
Coherence: NY-K.CC.4c → NY-1.OA.5

e.g., by counting on 2 to add 2

6a. Add and subtract within 20. Use strategies such as:

Coherence: NY-K.OA.3, NY-K.OA.4, NY-K.OA.5 → NY-1.OA.6 → NY-2.OA.2

- counting on;



- making ten;

e.g., 8 + 6 =
8 + 2 + 4 =
10 + 4 = 14

- decomposing a number leading to a ten;

e.g., 13 – 4 =
13 – 3 – 1 =
10 – 1 = 9

- using the relationship between addition and subtraction; and

e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4

- creating equivalent but easier or known sums.

e.g., adding 6 + 7 by creating the known equivalent
6 + 6 + 1 = 12 + 1 = 13

6b. Fluently add and subtract within 10.

Note on *Fluency* with Facts:

- *Fluently* adding and subtracting within 10 (NY-1.OA.6b) means students can find sums and differences within 10 reasonably quickly, and say or write it. Fluency involves a mixture of just knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.[(10)] Students grow in fluency throughout the year as they work with addition and subtraction situations.[(9)] For more on how children develop fluency, see *K–5 Progression on Counting and Cardinality and Operations and Algebraic Thinking*, pp. 18-19 and *Adding it Up*, pp. 182-195.

Connecting the Standards for Mathematical Practice to Mathematical Content:

- Grade 1 students work with some sophisticated addition and subtraction situations (NY-1.OA.1), such as “Lucy has 8 fewer apples than Julie. Julie has 12 apples. How many apples does Lucy have?” Making a math drawing or using objects to model the situation is very helpful for students (MP.5). The equations 12 – 8 = ?, 8 + ? = 12, and ? + 8 = 12 are all mathematical models of this situation (MP.4).[(9)]

NY-1.OA	Operations and Algebraic Thinking
Work with addition and subtraction equations.	
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 = 6 7 = 8 – 1 5 + 2 = 2 + 5 4 + 1 = 5 + 2
8. Determine the unknown whole number in an addition or subtraction equation with the unknown in all positions.	e.g., Determine the unknown number that makes the equation true in each of the equations: 8 + ? = 11 __ – 3 = 5 6 + 6 = ☐

Within-Grade Connections:

- Understanding the meaning of the equal sign (NY-1.OA.7) is a crucial aspect of and solving equations (NY-1.OA.8). In order to gain understanding of the equal sign and solving equations, students must see varied equation forms – especially those with only one number on the left side of the equation. Through this work, students come to understand where the total is in addition equations (alone on one side) and in subtraction equations (before the minus sign). [9]

NY-1.NBT	Number and Operations in Base Ten	
Extend the counting sequence.		
1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	Coherence: NY-K.CC.1 NY-K.CC.2 NY-K.CC.3 → NY-1.NBT.1 → NY-2.NBT.2 NY-2.NBT.3	

Within-Grade Connections:

- Units are a connection between place value (NY-1.NBT) and measurement (NY-1.MD). Working with place value depends on having a sense of the sizes of the base-ten units and being able to see a larger unit as composed of smaller units within the system.[(11)]

NY-1.NBT	Number and Operations in Base Ten
Understand place value.	
2. Understand that the two digits of a two-digit number represent amounts of tens and ones. a. Understand 10 can be thought of as a bundle of ten ones, called a "ten". b. Understand the numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. Understand 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).	Coherence: NY-K.NBT.1 → NY-1.NBT.2 → NY-2.NBT.1
3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	Coherence: NY-K.CC.7 → NY-1.NBT.3 → NY-2.NBT.4

NY-1.NBT	Number and Operations in Base Ten
Use place value understanding and properties of operations to add and subtract.	
4. Add within 100, including • a two-digit number and a one-digit number, • a two-digit number and a multiple of 10. Use concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten. Relate the strategy to a written representation and explain the reasoning used.	Coherence: NY-1.NBT.4 → NY-2.NBT.5, NY-2.NBT.7 Note on and/or: Students should be taught to use strategies based on place value, properties of operations, *and* the relationship between addition and subtraction; however, when solving any problem, students can choose any strategy. Note: A *written representation* is any way of showing a strategy using words, pictures, or numbers.
5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	Coherence: NY-1.NBT.5 → NY-2.NBT.8
6. Subtract multiples of 10 from multiples of 10 in the range 10-90 using • concrete models or drawings, and • strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Relate the strategy used to a written representation and explain the reasoning.	Coherence: NY-1.NBT.6 → NY-2.NBT.8 Note on and/or: Students should be taught to use concrete models and drawings; as well as strategies based on place value, properties of operations, *and* the relationship between addition and subtraction. When solving any problem, students can choose to use a concrete model *or* a drawing. Their strategy must be based on place value, properties of operations, or the relationship between addition and subtraction. Note: A *written representation* is any way of showing a strategy using words, pictures, or numbers.

Within-Grade Connections:

- Quickly finding 10 more or 10 less than a two-digit number (NY-1.NBT.5) is a good indicator of whether students have an understanding of place value for two-digit numbers (NY-1.NBT.2).[(9)]

Connecting the Standards for Mathematical Practice to Mathematical Content:

- All work with properties (NY-1.OA.3) and place value (e.g., NY-1.NBT.2 & 4) should be seen as an investigation and use of the structure of the number system and of arithmetic (MP.7). Students' explanations of the properties and reasoning that they used in these contexts are early beginnings of the construction of (brief) logical arguments (MP.3). Examples of brief but excellent arguments at this grade level could include:
  - I know that 7 – 3 equals 4 because 4 + 3 equals 7. (This shows NY-1.OA.4 being met.)
  - I knew that 8 + 8 = 20 was wrong because 10 + 10 equals 20 and 8 is less than 10.
  - I know that 8 + 7 equals 15 because I know that 8 + 8 equals 16.[(9)]
- When students add two-digit numbers (NY-1.NBT.4), they "Look for and express regularity in repeated reasoning" (MP.8). Students will repeatedly think about the units of ten and the units of one in their concrete models or drawings and in their recorded written methods. During this work, students are also "modeling with mathematics" (MP.4).[(9)]

NY-1.MD	Measurement and Data
Measure lengths indirectly and by iterating length units.	
1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.	Coherence: NY-K.MD.2 → NY-1.MD.1 → NY-2.MD.4
2. Measure the length of an object using same-size "length units" placed end to end with no gaps or overlaps. Express the length of an object as a whole number of "length units."	Coherence: NY-1.MD.2 → NY-2.MD.1 Note: "Length units" could include cubes, paper clips, etc.

Within-Grade Connections:

- Units are a connection between place value (NY-1.NBT) and measurement (NY-1.MD). Working with place value depends on having a sense of the sizes of the base-ten units and being able to see a larger unit as composed of smaller units within the system.[9]
- Measurement standards NY-1.MD.1 and NY-1.MD.2 together support and provide a context for the goal of solving problems that involve comparing (NY-1.OA.1).[9]

NY-1.MD	Measurement and Data
Tell and write time and money.	
3a. Tell and write time in hours and half-hours using analog and digital clocks. Develop an understanding of common terms, such as, but not limited to, *o'clock* and *half past*.	Coherence: NY-1.MD.3a → NY-2.MD.7
3b. Recognize and identify coins (penny, nickel, dime, and quarter) and their value and use the cent symbol (¢) appropriately.	Coherence: NY-K.MD.4 → NY-1.MD.3b
3c. Count a mixed collection of dimes and pennies and determine the cent value (total not to exceed 100 cents).	Coherence: NY-1.MD.3c → NY-2.MD.8 e.g., 3 dimes and 4 pennies is the same as 3 tens and 4 ones, which is 34¢.

Within-Grade Connections:

- While students are dealing with the limited precision of only whole hours and half-hours (NY-1.MD.3a), they must distinguish the position of the hour hand. This connects to partitioning circles into halves and quarters (NY-1.G.3).[9]
- When students count a mixed collection of dimes and pennies (NY-1.MD.3c), they develop understanding of place value (NY-1.NBT.2) and practice adding within 100 (NY-1.NBT.4-5).

NY-1.MD	Measurement and Data
Represent and interpret data. 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.	Coherence: NY-K.MD.3 → NY-1.MD.4 → NY-2.MD.10

Within-Grade Connections:

- When students 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 (NY-1.MD.4), they practice adding and subtracting numbers (NY-1.OA).[(9)]

NY-1.G	Geometry
Reason with shapes and their attributes.	
1. Distinguish between defining attributes versus non-defining attributes for a wide variety of shapes. Build and/or draw shapes to possess defining attributes.	Coherence: NY-K.G.4 → NY-1.G.1 → NY-2.G.1 e.g., • A defining attribute may include, but is not limited to: triangles are closed and three-sided. • Non-defining attributes include, but are not limited to: color, orientation, and overall size. Note on and/or: Students should be taught to build *and* draw shapes to possess defining attributes; however, when answering questions, students can choose to build *or* draw the shape.
2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. Note: Students do not need to learn formal names such as "right rectangular prism."	Coherence: NY-K.G.6 → NY-1.G.2
3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of.* Describe the whole as *two of,* or *four of* the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	Coherence: NY-1.G.3 → NY-2.G.3

Within-Grade Connections:

- Composing shapes to create a new shape (NY-1.G.2) is the spatial analogue of composing numbers to create new numbers (NY-1.NBT.2). This concept is also connected to length measurement (NY-1.MD.2) since students must visualize an object that is to be measured as being built up out of equal-sized units (see also NY-1.G.3). Though assembling two congruent right triangles into a rectangle does not use the same facts or reasoning that assembling two fives into a ten uses, the idea of looking at how objects in some domain (numbers or shapes) can be combined to make other objects in that domain, and looking for new true statements one can make about these combinations, is a big idea that is common across mathematics.[(9)]