

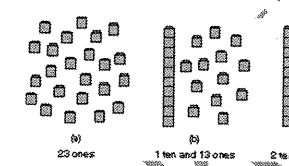
Number Sense and Operations

Grades 1-2	Learning Standards	Selected Problems or Classroom Activities
	<p><i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i></p> <p>2.N.1 Name and write (in numerals) whole numbers to 1000, identify the place values of the digits, and order the numbers.</p> <p>2.N.2 Identify and distinguish among multiple uses of numbers, including cardinal (to tell how many) and ordinal (to tell which one in an ordered list), and numbers as labels and as measurements.</p> <p>2.N.3 Identify and represent common fractions (1/2, 1/3, 1/4) as parts of wholes, parts of groups, and numbers on the number line.</p> <p>2.N.4 Compare whole numbers using terms and symbols, e.g., less than, equal to, greater than (<, =, >).</p> <p>2.N.5 Identify odd and even numbers and determine whether a set of objects has an odd or even number of elements.</p> <p>2.N.6 Identify the value of a collection of coins and dollar bills and different ways to represent an amount of money up to \$5. Use appropriate notation, e.g., 69¢, \$1.00.</p> <p>2.N.7 Demonstrate an understanding of various meanings of addition and subtraction, e.g., addition as combination (plus, combined with, more), subtraction as comparison (how much less, how much more), equalizing (how many more are needed to make these equalized separation (how much remaining)).</p> <p>2.N.8 Understand and use the inverse relationship between addition and subtraction (e.g., 9 + 6 = 14 is equivalent to 14 - 6 = 8 and is also equivalent to 14 - 8 = 6) to solve problems and check solutions.</p> <p>2.N.9 Know addition facts (addends to ten) and related subtraction facts, and use them to solve problems.</p> <p>2.N.10 Demonstrate the ability to add and subtract three-digit numbers accurately and efficiently.</p> <p>2.N.11 Demonstrate fluency in understanding of and the ability to use the conventional algorithms for addition (two 3-digit numbers and three 2-digit numbers) and subtraction (two 3-digit numbers).</p> <p>2.N.12 Estimate, calculate, and solve problems involving addition and subtraction of two-digit numbers. Describe differences between estimates and actual calculations.</p>	See next page for sample problems.

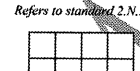
Exploratory Concepts and Skills

- Use concrete materials to investigate situations that lead to multiplication and division.
- Develop and use strategies for addition and subtraction of multi-digit whole numbers. Check by estimation.
- Investigate addition of common fractions, e.g., $1/2 + 1/2 = 1$, $1/4 + 1/4 = 1/2$.
- Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally.

Refers to standard 2.N.1
Use 6, 6, and 4.
Write the smallest three-digit number:
Write the greatest three-digit number:
Write other numbers using the same digits:

Refers to standard 2.N.11


23 ones 1 ten and 13 ones 2 tens and 3 ones

Refers to standard 2.N.3


Count the small squares and color 1/4 of them.

Refers to standard 2.N.6
P N N P N N
P stands for penny and N stands for nickel. If the pattern continues until there are 12 coins altogether, what is the total value of all 12 coins?

Mathematics | Grade 1

In Grade 1, instructional time should focus on four critical 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; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They 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. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They 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. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

(2) Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They 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). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

(3) 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.¹

(4) Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Grade 1

Introduction

In grade 1, instructional time should focus on four critical 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; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

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- 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.¹
- Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

Grade 1 Overview

Operations and Algebraic Thinking

- 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

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

Measurement and Data

- Measure lengths indirectly and by iterating length units.
- Tell and write time.
- Represent and interpret data.

Geometry

- Reason with shapes and their attributes.

Mathematical Practices

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

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Measurement and Data

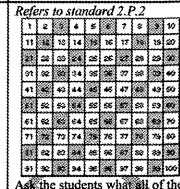
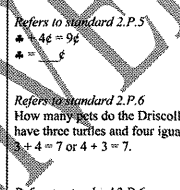
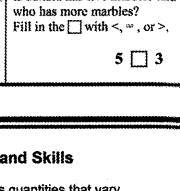
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- Work with money.

Geometry

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Standards for Mathematical Practice

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Use appropriate tools.
- Use appropriate tools.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Grades 1-2	Learning Standards	Selected Problems or Classroom Activities
	<p><i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i></p> <p>2.P.1 Identify, reproduce, describe, extend, and create simple rhythmic, shape, size, number, color, and letter repeating patterns.</p> <p>2.P.2 Identify different patterns on the hundreds chart.</p> <p>2.P.3 Describe and create addition and subtraction number patterns, e.g., 1, 4, 7, 10, ... or 25, 23, 21, ...</p> <p>2.P.4 Skip count by twos, fives, and tens up to at least 50, starting at any number.</p> <p>2.P.5 Construct and solve open sentences that have variables, e.g., $\square + 7 = 10$.</p> <p>2.P.6 Write number sentences using +, -, =, <, >, or = to represent mathematical relationships in everyday situations.</p> <p>2.P.7 Describe functions related to trading, including copyrights and measurement trades, e.g., five pennies make one nickel or four cups make one quart.</p>	<p>Refers to standard 2.P.2  </p> <p>Refers to standard 2.P.5  </p> <p>Refers to standard 2.P.6  </p>

Exploratory Concepts and Skills

- Investigate situations with variables as unknowns and as quantities that vary.

Geometry

Grades 1-2	Learning Standards	Selected Problems or Classroom Activities
	<p><i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i></p> <p>2.G.1 Describe attributes and parts of two- and three-dimensional shapes, e.g., length of sides, and number of corners, edges, faces, and sides.</p> <p>2.G.2 Identify, describe, draw, and compare two-dimensional shapes, including both polygonal (up to six sides) and curved figures such as circles.</p> <p>2.G.3 Recognize congruent shapes.</p> <p>2.G.4 Identify shapes that have been rotated (turned), reflected (flipped), translated (slid), and enlarged. Describe direction of translations, e.g., left, right, up, down.</p> <p>2.G.5 Identify symmetry in two-dimensional shapes.</p> <p>2.G.6 Predict the results of putting shapes together and taking them apart.</p> <p>2.G.7 Relate geometric ideas to numbers, e.g., seeing rows in an array as a model of repeated addition.</p>	See next page for sample problems.

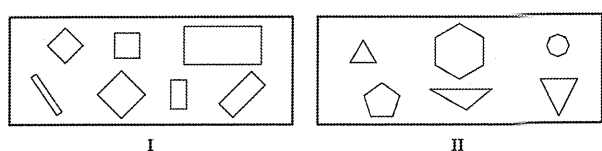
Exploratory Concepts and Skills

- Investigate symmetry in two-dimensional shapes with mirrors or by paper folding.
- Explore intersecting, parallel, and perpendicular lines.
- Create mental maps of geographic shapes using spatial memory and spatial visualization.
- Recognize and represent shapes from different perspectives.
- Recognize geometric shapes and structures in the environment and specify their location.
- Identify relative positions, e.g., closer, farther, higher, lower.
- Find and name locations on maps and express simple relationships, e.g., near to, far away from, etc.

Refers to standards 2.G.1, 2.G.2, and 2.G.3
Use geoblocks. For each block:

- Trace the faces.
- Identify the shape of each face.
- Tell the number of congruent faces.

Refers to standards 2.G.1, 2.G.2, and 2.G.4
Use the sets below to answer the question.



What rule did Chya use to sort the shapes above into two groups?

- I = three sides
- I = four sides
- I = big shapes
- I = small shapes
- I = shapes with right angles
- I = shapes without right angles
- I = shapes with four or more angles
- I = shapes with fewer than four angles

Operations and Algebraic Thinking

1.OA

Represent and solve problems involving addition and subtraction.

- Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.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 equations with a symbol for the unknown number to represent the problem.

Understand and apply properties of operations and the relationship between addition and subtraction.

- Apply properties of operations as strategies to add and subtract.³ Examples: If $8 + 5 = 13$ 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.)
- Understand subtraction as an unknown-addend problem. For example, subtract $10 - 8$ by finding the number that makes 10 when added to 8.

Add and subtract within 20.

- Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
- Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on, making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$), decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 1 - 3 = 10 - 3 = 7$), using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$), and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 1 + 12 + 1 = 13$).

Work with addition and subtraction equations.

- Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? $6 = 7 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.
- Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 + \square = 12$, $5 = \square - 3$, $6 + 6 = \square$.

Number and Operations in Base Ten

1.NB.T

Extend the counting sequence.

- 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.

Understand place value.

- Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
 - 10 can be thought of as a bundle of ten ones—called a "ten."
 - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
 - 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).

¹See Glossary, Table 1.
²Students need not use formal terms for these properties.

Use place value understanding and properties of operations to add and subtract.

- Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, 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 to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
- Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), 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 to a written method and explain the reasoning used.

Measurement and Data

1.MD

Measure lengths indirectly and by iterating length units.

- Order three objects by length; compare the lengths of two objects indirectly by using a third object.
- 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.

Tell and write time.

- Tell and write time in hours and half-hours using analog and digital clocks.

Represent and interpret data.

- 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.

Geometry

1.G

Reason with shapes and their attributes.

- Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
- 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.
- 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 that for these examples that decomposing into more equal shares creates smaller shares.

¹Students do not need to use formal names such as "right rectangular prism."

Number and Operations in Base Ten

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- 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.

Understand place value.

- Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
 - 10 can be thought of as a bundle of ten ones—called a "ten."
 - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.

- 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).

- Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.

Use place value understanding and properties of operations to add and subtract.

- Add within 100, including adding a two-digit number and a one-digit number and a multiple of 10, 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 to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten.
- Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. Identify arithmetic patterns of 10 more and 10 less using strategies based on place value.
- Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), 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 to a written method and explain the reasoning used.

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Tell and write time.

- Tell and write time in hours and half-hours using analog and digital clocks.

Represent and interpret data.

- 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.

Work with money.

- Identify the values of all U.S. coins and know their comparative values (e.g., a dime is of greater value than a nickel). Find equivalent values (e.g., a nickel is equivalent to five pennies). Use appropriate notation (e.g., 69¢). Use the values of coins in the solutions of problems (up to 100¢).

Geometry

1.G

Reason with shapes and their attributes.

- Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes that possess defining attributes (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.
- 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 that for these examples that decomposing into more equal shares creates smaller shares.