Ohio's Model Curriculum | Mathematics

with Instructional Supports

Grade 1

Ohio | Department of Education

Mathematics Model Curriculum
with Instructional Supports
Grade 1

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Introduction

PURPOSE OF THE MODEL CURRICULUM

Just as the standards are required by Ohio Revised Code, so is the development of the model curriculum for those standards. Throughout the development of the standards (2016-17) and the model curriculum (2017-18), the Ohio Department of Education (ODE) has involved educators from around the state at all levels, Pre-K–16. The model curriculum reflects best practices and the expertise of Ohio educators, but it is not a complete a curriculum nor is it mandated for use. The purpose of Ohio's model curriculum is to provide clarity to the standards, a foundation for aligned assessments, and guidelines to assist educators in implementing the standards.

COMPONENTS OF THE MODEL CURRICULUM

The model curriculum contains two sections: Expectations for Learning and Content Elaborations.

Expectations for Learning: This section begins with an introductory paragraph describing the cluster's position in the respective learning progression, including previous learning and future learning. Following are three subsections: Essential Understandings, Mathematical Thinking, and Instructional Focus.

- **Essential Understandings** are the important concepts students should develop. When students have internalized these conceptual understandings, application and transfer of learning results.
- **Mathematical Thinking** statements describe the mental processes and practices important to the cluster.
- **Instructional Focus** statements are key skills and procedures students should know and demonstrate.

Together these three subsections guide the choice of lessons and formative assessments and ultimately set the parameters for aligned state assessments.

Content Elaborations: This section provides further clarification of the standards, links the critical areas of focus, and connects related standards within a grade or course.

COMPONENTS OF INSTRUCTIONAL SUPPORTS

The Instructional Supports section contains the **Instructional Strategies** and **Instructional Tools/Resources** sections which are designed to be fluid and improving over time, through additional research and input from the field. The **Instructional Strategies** are descriptions of effective and promising strategies for engaging students in observation, exploration, and problem solving targeted to the concepts and skills in the cluster of standards. Descriptions of common misconceptions as well as strategies for avoiding or overcoming them and ideas for adapting instructions to meet the needs of all students are threaded throughout. The **Instruction Tools/Resources** are links relevant research, tools, and technology. In our effort to make sure that our Instructional Supports reflect best practices, this section is under revision and will be published in 2018.

Standards for Mathematical Practice

The Standards for Mathematical Practice describe the skills that mathematics educators should seek to develop in their students. The descriptions of the mathematical practices in this document provide examples of how student performance will change and grow as they engage with and master new and more advanced mathematical ideas across the grade levels.

MP.1 Make sense of problems and persevere in solving them.
In Grade 1, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.

MP.2 Reason abstractly and quantitatively.
Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.

In first grade students make sense of quantities and relationships while solving tasks. They represent situations by decontextualizing tasks into numbers and symbols. For example, "There are 60 children on the playground and some children go line up. If there are 20 children still playing, how many children lined up?" Students translate the situation into the equation: $60 - 20 = \square$ and then solve the task. Students also contextualize situations during the problem solving process. For example, students refer to the context of the task to determine they need to subtract 20 from 60 because the total number of children on the playground is the total number less the 20 that are still playing. Students might also reason about ways to partition two-dimensional geometric figures into halves and fourths.

MP.3 Construct viable arguments and critique the reasoning of others.
First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?", "Explain your thinking.", and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions. For example, "There are 15 books on the shelf. If you take some books off the shelf and there are now 7 left, how many books did you take off the shelf?" Students might use a variety of strategies to solve the task and then share and discuss their problem solving strategies with their classmates.
Continued on next page

Standards for Mathematical Practice, continued

MP.4 Model with mathematics.
In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.

First grade students model real-life mathematical situations with a number sentence or an equation and check to make sure equations accurately match the problem context. Students use concrete models and pictorial representations while solving tasks and also write an equation to model problem situations. For example, to solve the problem, "There are 11 bananas on the counter. If you eat 4 bananas, how many are left?" students could write the equation $11 - 4 = 7$. Students also create a story context for an equation such as $13 - 7 = 6$.

MP.5 Use appropriate tools strategically.
In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.

In first grade students use tools such as counters, place value (base ten) blocks, hundreds number boards, number lines, concrete geometric shapes (e.g., pattern blocks, 3-dimensional solids), and virtual representations to support conceptual understanding and mathematical thinking. Students determine which tools are the most appropriate to use. For example, when solving $12 + 8 = \square$, students explain why place value blocks are more appropriate than counters.

MP.6 Attend to precision.
As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning. In Grade 1, students use precise communication, calculation, and measurement skills. Students are able to describe their solutions strategies to mathematical tasks using grade-level appropriate vocabulary, precise explanations, and mathematical reasoning. When students measure objects iteratively (repetitively), they check to make sure there are no gaps or overlaps. Students regularly check their work to ensure the accuracy and reasonableness of solutions.
Continued on next page

Standards for Mathematical Practice, continued

MP.7 Look for and make use of structure.

First graders begin to discern a pattern or structure. For instance, if students recognize $12 + 3 = 15$, then they also know $3 + 12 = 15$. (Commutative Property of Addition.) To add 4 + 6 + 4, the first two numbers can be added to make a ten, so $4 + 6 + 4 = 10 + 4 = 14$. While solving addition problems, students begin to recognize the commutative property, for example $7 + 4 = 11$, and $4 + 7 = 11$. While decomposing two-digit numbers, students realize that any two-digit number can be broken up into tens and ones, e.g. 35 = 30 + 5, 76 = 70 + 6. Grade 1 students make use of structure when they work with subtraction as a missing addend problem, such as $13 - 7 = \square$ can be written as $7 + \square = 13$ and can be thought of as how much more do I need to add to 7 to get to 13?

MP.8 Look for and express regularity in repeated reasoning.

Grade 1 students begin to look for regularity in problem structures when solving mathematical tasks. For example, students add three one-digit numbers by using strategies such as "make a ten" or doubles. Students recognize when and how to use strategies to solve similar problems. For example, when evaluating 8 + 7 + 2, a student may say, "I know that 8 and 2 equals 10, then I add 7 to get to 17. It helps if I can make a 10 out of two numbers when I start." Students use repeated reasoning while solving a task with multiple correct answers. For example, solve the problem, "There are 12 crayons in the box. Some are red and some are blue. How many of each could there be?" Students use repeated reasoning to find pairs of numbers that add up to 12, e.g., the 12 crayons could include 6 of each color $(6 + 6 = 12)$, 7 of one color and 5 of another $(7 + 5 = 12)$, etc.

Mathematics Model Curriculum
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Grade 1

STANDARDS	MODEL CURRICULUM
OPERATIONS AND ALGEBRAIC THINKING **Represent and solve problems involving addition and subtraction.** **1.OA.1** 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. See Table 1, page 95. **1.OA.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. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)	**Expectations for Learning** This cluster extends understanding of addition and subtraction concepts explored in Kindergarten. Now students use more sophisticated computational strategies in mathematical situations with quantities up to 20. (See Table 1, page 95.) Students explore addition and subtraction within a real-world context using objects, drawings, and equations. Students experience mathematical situations with unknowns, and solve addition word problems with up to three addends. The position of the unknowns could vary based on the mathematical situation. In Grade 2, students will continue to develop computational strategies working within 100 to solve one- and two-step word problems. **ESSENTIAL UNDERSTANDINGS** • Real-world mathematical situations can be represented using objects, drawings, and equations. • An unknown can be in any position of a mathematical situation. • Mathematical situations can include multiple addends. **MATHEMATICAL THINKING** • Represent and solve real-world mathematical situations accurately. • Use grade-level appropriate mathematical language to explain reasoning. • Justify mathematical models used and explain solutions. • Determine reasonableness of results. *Continued on next page*

Expectations for learning, continued

INSTRUCTIONAL FOCUS

- Reason with mathematical situations and determine the operation necessary.
- Solve four types of problems: add to, take from, pull together/take apart, and compare. See Table 1, page 95.
- Evaluate and solve mathematical situations involving three subtypes: result unknown, change unknown, and start unknown. See Table 1, page 95.
- Solve problems with an unknown that is represented by an empty box or a picture.
- Model a mathematical situation using objects, drawing a picture, and using an equation.
- Solve mathematical situations involving three addends with a sum to 20.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus Grade 1, Number 1, pages 7-8
- Ohio 's K-8 Learning Progressions, Operations and Algebraic Thinking, pages 8-10

CONNECTIONS ACROSS STANDARDS

- Interpret data to answer questions about how many more or how many less (1.MD.4).
- Use place value understanding to add and subtract (1.NBT.4).
- Use properties of operations to add and subtract (1.OA.3-4).
- Add and subtract within 20 (1.OA.6).
- Understand the equal sign (1.OA.7).
- Determine the unknown whole number in an addition or subtraction equation (1.OA.8).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

This section is under revision and will be published in 2018.

Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
OPERATIONS AND ALGEBRAIC THINKING **Understand and apply properties of operations and the relationship between addition and subtraction.** **1.OA.3** Apply properties of operations as strategies to add and subtract. *For example, 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).* Students need not use formal terms for these properties. **1.OA.4** Understand subtraction as an unknown-addend problem. *For example, subtract 10 − 8 by finding the number that makes 10 when added to 8.*	**Expectations for Learning** In Kindergarten, students explored addition as putting together and adding to, and subtraction as taking apart and taking from. In Grade 1, students further develop the relationship between addition and subtraction. Students solve more complex addition and subtraction mathematical situations. They develop a conceptual understanding of ordering and rearranging numbers to find the sum. Students do not need to know the names of the properties as they will use formal terminology in later grades. **ESSENTIAL UNDERSTANDINGS** • The relationship between addition and subtraction allows solving for unknowns in any position. • The order of numbers in addition does not change the sum. • The numbers in an addition problem can be rearranged or regrouped without changing the sum. For example, 6 + 7 = 10 + 3 is a use of the associative property where the numbers are regrouped rather than being rearranged. **MATHEMATICAL THINKING** • Use grade-level appropriate mathematical language to explain and justify reasoning. • Determine reasonableness of results. • Use informal reasoning. • Explore and generalize concepts based on patterns and structures. *Continued on next page*

Expectations for Learning, continued

INSTRUCTIONAL FOCUS

- Develop the conceptual understanding behind the use of the mathematical properties of addition (commutative and associative properties).
- Develop the conceptual understanding that adding and subtracting with zero gives the same number (Additive Identity Property). See Table 3, page 97.
- Explore how subtraction can be used to solve mathematical situations with unknown addends.
- Use different strategies or properties of operations flexibly.
- Explore the relationship between addition and subtraction to solve for unknowns in any position. See Table 1, page 95.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus, Grade 1, Number 1, pages 7-8
- Ohio's K-8 Learning Progressions, Operations and Algebraic Thinking, pages 8-10

CONNECTIONS ACROSS STANDARDS

- Solve problems using three addends (1.OA.2).
- Add and subtract within 20 (1.OA.6).
- Understand the equal sign (1.OA.7).
- Determine the unknown whole number in an addition or subtraction equation (1.OA.8).
- There is a relationship between addition and subtraction (1.NBT.4).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

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Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
OPERATIONS AND ALGEBRAIC THINKING **Add and subtract within 20.** **1.OA.5** Relate counting to addition and subtraction, e.g., by counting on[G] 2 to add 2. **1.OA.6** Add and subtract within 20, demonstrating fluency[G] with various strategies for addition and subtraction within 10. Strategies may include 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, 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 + 6 + 1 = 12 + 1 = 13.	**Expectations for Learning** In Kindergarten, students developed fluency when adding and subtracting within 5. In Grade 1, students continue to develop a variety of efficient strategies for fluency when adding and subtracting within 10. *(Fluency is the ability to use efficient, accurate, and flexible methods for computing. Fluency does not imply timed tests)*. Students continue to develop understanding of the relationship between addition and subtraction within 20. Students use counting on or back as a strategy when beginning at any number to add or subtract. In Grade 2, students will develop fluency when adding and subtracting within 20. **ESSENTIAL UNDERSTANDINGS** • Addition occurs when counting forward. • Subtraction occurs when counting back. • Addition and subtraction are related (inverse operations). • Fluency means being efficient, accurate, and flexible with addition and subtraction strategies. **MATHEMATICAL THINKING** • Use grade-level appropriate mathematical language to explain and justify reasoning. • Compute using strategies or models with grade-level numbers. • Recognize some strategies may be more efficient than others. • Explore and generalize concepts based on patterns and structures. **INSTRUCTIONAL FOCUS** • Explain the relationship between counting and adding or subtracting. • Continue to scaffold previous learning; such as properties of operations, relationships between addition and subtraction, etc. • Compute efficiently, accurately, and flexibly within 10. • Develop a variety of strategies to add and subtract within 20. • Demonstrate that problems can be solved in a variety of ways. • Describe why some strategies are more efficient than others.

	Content Elaborations • Ohio's K-8 Critical Areas of Focus, Grade 1, Number 1, pages 7-8 • Ohio 's K-8 Learning Progressions, Operations and Algebraic Thinking, pages 8-10 **CONNECTIONS ACROSS STANDARDS** • Real-world mathematical situations can be represented using objects, drawings, and equations (1.OA.1). • The order of numbers in addition does not change the sum (1.OA.3). • Determine the unknown whole number in an addition or subtraction equation (1.OA.8). • Interpret data to answer questions about how many more or how many less (1. MD.4). • Use the relationship between addition and subtraction (1.NBT.4).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

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STANDARDS	MODEL CURRICULUM
OPERATIONS AND ALGEBRAIC THINKING **Work with addition and subtraction equations.** **1.OA.7** 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 = 6; 7 = 8 – 1; 5 + 2 = 2 + 5; 4 + 1 = 5 + 2.* **1.OA.8** 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:* $8 + \square = 11$; $5 = \square - 3$; $6 + 6 = \square$.	**Expectations for Learning** This cluster builds upon the Kindergarten understanding of comparing two collections. In Kindergarten, students used the phrase "the same as" when referencing equality. In Grade 1, students continue to develop the understanding of equality and use the equal sign when expressing mathematical equations. The goal is for students to conceptualize that the equal sign is a comparison of equal (same value) mathematical statements. This knowledge of equality helps students determine the unknown number regardless of placement in the equation. In future learning, students will apply a conceptual understanding of the equal and inequality symbols, as well as solve for unknowns to more complex situations. **ESSENTIAL UNDERSTANDINGS** • An equal sign represents a relationship between two mathematical expressions. • To be a true equation, quantities on both sides of the equal sign must have the same value. • The total can go on the right or left side of the equal sign. • An equation can have an unknown in any position. **MATHEMATICAL THINKING** • Use grade-level appropriate mathematical language to explain and justify reasoning. • Compute using strategies or models with grade-level numbers. • Pay attention to and make sense of quantities. **INSTRUCTIONAL FOCUS** • Recognize and explain the meaning of the equal symbol. • Determine if both sides of an equation are equal (true) or unequal (false). • Explain why equations in formats other than $a + b = c$ are true or false, e.g., $a = a$, $c = a + b$, $a = a + 0$, $a + b = b + a$. • Solve equations with the unknown (represented by an empty box or picture) in all positions. • Compare expressions without calculating.

	Content Elaborations • Ohio's K-8 Critical Area of Focus Grade 1, Number 1, pages 7-8 • Ohio 's K-8 Learning Progressions, Operations and Algebraic Thinking, pages 8-10 **CONNECTIONS ACROSS STANDARDS** • Compare numbers using symbols (1.NBT.3). • Represent addition and subtraction with unknowns in all positions (1.OA.1). • Fluently add and subtract (1.OA.6). • Compare and compute with data (1.MD.4).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

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Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
NUMBERS AND OPERATIONS IN BASE TEN **Extend the counting sequence.** **1.NBT.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.	**Expectations for Learning** This standard extends the counting sequence from 100 in Kindergarten to 120 in Grade 1, and extends reading and writing numerals from 20 to 120. In Grade 1, students are expected to rote count from any given number to 120. They read and write numerals and represent a number of objects with a written numeral. In Grade 2, students will count by ones, tens, and hundreds forward and backward within 1,000. They will read and write numbers to 1,000 using base ten numerals, number names, expanded form, and equivalent representations. **ESSENTIAL UNDERSTANDINGS** • Rote counting is a repeating pattern. • The cardinality of a group is the total number of objects in the group. **MATHEMATICAL THINKING** • Explore and generalize concepts based on patterns or structures. **INSTRUCTIONAL FOCUS** • Use and verbalize the successive number names' pattern for counting by ones and decades (by tens) sequence. • Extend the rote counting sequence to 120 from different starting points. • Recognize and explain a visual pattern in written numerals. • Recognize and explain word patterns from 20–99. • Recognize and explain numerals have a repeating pattern between 20–99. • Recognize and explain word patterns from 100–120. • Recognize and explain numerals have a repeating pattern between 100–120. • Write numerals 0–120. • Represent objects with a written numeral (1–120). *Continued on next page*

	Content Elaborations • Ohio's K-8 Critical Areas of Focus, Grade 1, Number 2, page 9 • Ohio's K-8 Learning Progressions, Number and Operations in Base Ten, pages 4-5 **CONNECTIONS ACROSS STANDARDS** • Understand the patterns of ones, tens, and hundreds (1.NBT.2). • Use pennies and dimes to count (1.MD.3).

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STANDARDS	MODEL CURRICULUM
NUMBERS AND OPERATIONS IN BASE TEN **Understand place value.** **1.NBT.2** 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; and 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.3** Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	**Expectations for Learning** In Kindergarten, students develop an understanding of ones and tens to decompose a number up to 19, representing that number as ten ones and more ones. Students also compared one-digit numbers without using comparison symbols. In Grade 1, students develop the conceptual understanding of a group of ten ones as one "ten". This is the foundation of understanding place and value of numbers. Students are introduced to comparison symbols and use the symbols >, =, and < when comparing two two-digit numbers. In Grade 2, students will extend their understanding from two-digit to three-digit numbers, and they will compare two three-digit numbers. **ESSENTIAL UNDERSTANDINGS** • A group of ten ones is now referred to as a "ten." • A two-digit number is made up of tens and ones. • Numbers can be compared. • Symbols can be used to record the comparison between numbers. • A numeral can stand for a different amount depending on its place or position in a number. **MATHEMATICAL THINKING** • Pay attention to and make sense of quantities. • Use grade-level appropriate mathematical language and notation to explain and justify reasoning. • Determine reasonableness of results. • Use informal reasoning. • Explore and generalize concepts based on patterns and structures. *Continued on next page*

Expectations for Learning, continued

INSTRUCTIONAL FOCUS

- Represent two-digit numbers with proportional objects, e.g., cubes, beads, ten-frames, sticks, etc.
- Compose and decompose two-digit numbers into tens and ones with proportional objects.
- Count groups of ten objects using decade numbers.
- Draw a picture or create a model to express the value of a number.
- Explain the reversal of digits, e.g., "How is 14 different than 41?"
- Use mathematical language (greater than, less than, equal to) to describe the relationship between numbers.
- Connect the mathematical language to the use of symbols (>, =, and <) when describing the relationship between the numbers.
- Use symbols to record a comparison of two two-digit numbers.
- Explore two-digit numbers to discover that the value of the tens place helps determine the size of a two-digit number.
- Generalize the understanding that the value of the tens place helps to compare two two-digit numbers.
- Read comparative statements from left to right.
- Write two true inequality statements using symbols and words for a pair of unequal numbers, e.g., 5 > 3 and 3 < 5.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus Grade 1, Number 2, page 9
- Ohio's K-8 Learning Progressions, Number and Operations in Base Ten, pages 4-5

CONNECTIONS ACROSS STANDARDS

- Count, read, and write numerals to 120 (1.NBT.1).
- Add within 100 using place value strategies (1.NBT.4).
- Mentally find ten more or ten less than a given number (1.NBT.5).
- Subtract multiples of 10 between 10–90 (1.NBT.6).
- Use pennies and dimes to further place value understanding of ones and tens (1.MD.3).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

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Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
NUMBERS AND OPERATIONS IN BASE TEN **Use place value understanding and properties of operations to add and subtract.** **1.NBT.4** 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; record the strategy with a written numerical method (drawings and, when appropriate, equations) and explain the reasoning used. Understand that when adding two-digit numbers, tens are added to tens; ones are added to ones; and sometimes it is necessary to compose a ten. **1.NBT.5** Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. *Continued on next page*	**Expectations for Learning** This cluster of standards shifts from the Operations and Algebraic Thinking domain in Kindergarten to the Number and Operations in Base Ten domain in Grade 1 focusing on place value and properties of operations. In Kindergarten, students composed and decomposed numbers 1–19 to add and subtract within 10 using models or drawings. In Grade 1, students use models, drawings, and strategies to add within 100. They mentally find 10 more or 10 less than a given number. Also, students subtract multiples of ten from multiples of ten in the range of 10–90. In Grade 2, students will use models, drawings, and strategies to add and subtract within 1,000. Students will count by ones, tens, and hundreds forward and backward within 1,000, and they mentally find 10 more/ less or 100 more/ less than a given number. **ESSENTIAL UNDERSTANDINGS** • When adding numbers, the place and value of the digits is important for determining the sum. • When adding two-digit numbers, tens are added to tens, ones are added to ones. • When adding, sometimes it is necessary to compose a ten. • The digit in the ones place will remain the same when finding 10 more or 10 less of another number, e.g., 18 + 10 = 28. • There is a relationship between addition and subtraction. • When subtracting multiples of 10 from multiples of 10, the digit in the tens place changes and the digit in the ones place remains a zero, e.g., 60 – 20 = 40. • When subtracting multiples of 10 from any number, the digit in the tens place changes and the digit in the ones place remains the same, e.g., 82 – 30 = 52. *Continued on next page*

1.NBT.6 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.	**Expectations for Learning, continued**
	MATHEMATICAL THINKING
	• Pay attention to and make sense of quantities.
	• Use grade-level appropriate mathematical language and notation to explain and justify reasoning.
	• Determine reasonableness of results.
	• Use informal reasoning.
	• Explore and generalize concepts based on patterns and structures.
	
	INSTRUCTIONAL FOCUS
	• Compose and decompose two-digit numbers for the purpose of addition and subtraction.
	• Explore and explain addition and subtraction strategies by using models and/or drawings to justify thinking.
	• Apply place value strategies for addition and subtraction, and explain the reasoning used.
	• Explore the use of different properties of operations and the relationship between subtraction and addition; explain the reasoning used.
	• Discover the pattern when finding 10 more or 10 less than a given number.
	• Mentally find 10 more or 10 less than a given number explaining the reasoning used.
	• Compute using strategies and models:
	  o Add a two-digit number and a one-digit number;
	  o Add a two-digit number and a multiple of 10; and
	  o Subtract multiples of 10 in the range of 10-90 from multiples of 10 in that same range.
	• Explain the pattern when adding or subtracting a multiple of 10.
	• Record a numerical method with drawings and when appropriate equations.
	Continued on next page

	Content Elaborations • Ohio's K-8 Critical Areas of Focus, Number 1, pages 7-8 • Ohio's K-8 Learning Progressions, Number and Operations in Base Ten, pages 4-5 **CONNECTIONS ACROSS STANDARDS** • Use addition and subtraction within 20 to solve word problems with support (1.OA.1). • Relate counting to addition and subtraction (1.OA.5). • Fluently add and subtract within 10, and use strategies for adding and subtracting within 20 (1.OA.6). • Understand place value of tens and ones (1.NBT.2). • Use pennies and dimes to add and subtract (1.MD.3).

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STANDARDS	MODEL CURRICULUM
MEASUREMENT AND DATA **Measure lengths indirectly and by iterating length units.** **1.MD.1** Order three objects by length; compare the lengths of two objects indirectly by using a third object. **1.MD.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.*	**Expectations for Learning** In Kindergarten, students compared lengths of objects using terms such as "longer" and "shorter." In Grade 1, students compare length measurements to order the length of two objects indirectly using a third object. They use nonstandard units to measure the length of an object as a whole number of length units. In Grade 2, standard units of measure (inches, feet, centimeters, and meters) will be introduced. **ESSENTIAL UNDERSTANDINGS** • Length is a measureable attribute of an object. • The length remains constant, even if its orientation or position is changed. • Objects must be placed at the same endpoint for comparison. • Lengths of two objects can be compared indirectly by using a third object. • Copies of a shorter object can be used to measure the length of a longer object. • When measuring an object with nonstandard units, the same-size length unit is used. • When measuring an object with nonstandard units, no gaps or overlaps occur. **MATHEMATICAL THINKING** • Consider the measurement units (nonstandard) used in a problem. • Pay attention to and make sense of quantities. • Explain using informal mathematical reasoning. • Use mathematical language appropriate to the grade level. *Continued on next page*

Expectations for Learning, continued

INSTRUCTIONAL FOCUS

- Use the same length unit when comparing measurements of two objects.
- Compare measurements of two objects to determine which is longer and shorter.
- Compare the lengths of two objects indirectly by using a third object.
- Use the comparison of two objects to place a third object in order from shortest to longest.
- Explore measuring an object's length using multiple copies of various nonstandard tools that result in whole number length units.
- Accurately align length units from one end to the other with no gaps or overlaps in a straight path.
- Count length units to determine the object's total length; express as a whole number of length units.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus, Number 3, page 10
- Ohio's K-8 Learning Progressions, Measurement and Data, pages 12-14

CONNECTIONS ACROSS STANDARDS

- Count within 120 (1.NBT.1).
- Compare two-digit numbers (1.NBT.3).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

This section is under revision and will be published in 2018.

Instructional Tools/Resources

This section is under revision and will be published in 2018.

STANDARDS	MODEL CURRICULUM
MEASUREMENT AND DATA **Work with time and money.** **1.MD.3** Work with time and money. **a.** Tell and write time in hours and half-hours using analog and digital clocks. **b.** Identify pennies and dimes by name and value.	**Expectations for Learning** This cluster introduces money and time concepts. In Kindergarten, only pennies were used as a counting tool. In Grade 1, students find the value (connecting it to place value) of pennies and dimes. They also tell time on digital and analog clocks to the nearest hour and half-hour. In Grade 2, students will solve problems with pennies, nickels, dimes, and quarters and their collective value (up to one dollar). Students will also solve word problems with addition and subtraction within 100 involving whole dollars with whole dollars or cents with cents (not using dollars and cents simultaneously). In addition in Grade 2 students will tell time to the nearest 5 minutes and be introduced to a.m. and p.m. **ESSENTIAL UNDERSTANDINGS** **Time** • Time is a measureable attribute. • Time is measured in hours and minutes. • Time can be measured using an analog clock with an hour hand (short) and minute hand (long). • Time can be measured using a digital clock, e.g., 11 o'clock is represented as 11:00. **Money** • A penny is worth 1 cent (1¢). • A dime is worth 10 cents (10¢). • The size of a coin does not determine its value. **MATHEMATICAL THINKING** • Pay attention to and make sense of quantities. • Use technology as a tool for measurement. • Represent money and time symbolically. • Use mathematical language appropriate to the grade level. *Continued on next page*

Expectations for Learning, continued

INSTRUCTIONAL FOCUS

Time

- Recognize that numerals, or other markings, on a clock represent the hours.
- Explore and explain an hour as 60 minutes and half of one hour as 30 minutes.
- Use mathematical vocabulary to identify clock types and parts, e.g., hour hand, minute hand, analog, digital, etc.
- Interpret time on the hour and half hour on analog and digital clocks.
- Write time symbolically using a colon (**:**) to separate hours and minutes.

Money

- Recognize and name a penny.
- Identify that a penny's value equals 1 cent.
- Count by 1s using pennies.
- Recognize and name a dime.
- Identify that a dimes value equals 10 cents or 10 pennies.
- Count by 10s using dimes.
- Identify and use the cent symbol "¢" to represent coin values.
- Use pennies and dimes as a manipulative to reinforce place value up to 100 cents.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus, Grade 1, Number 2, page 9
- Ohio's K-8 Critical Areas of Focus, Grade 1, Number 3, page 10
- Ohio's K-8 Learning Progressions, Measurement and Data, pages 12-14

CONNECTIONS ACROSS STANDARDS

- Read and write numerals within 120 (1.NBT.1).
- Understand place value (1.NBT.2-3).
- Partition circle into halves (1.G.3).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

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Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
MEASUREMENT AND DATA **Represent and interpret data.** **1.MD.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.	**Expectations for Learning** In Kindergarten, students classified objects into categories, counted the number of objects in each category (up to 20 objects total), and sorted the categories by count. In Grade 1, students build on previous classifying skills to develop systems of organizing and interpreting data with up to three categories. The emphasis in Grades 1 and 2 is to solve addition and subtraction compare problems (Table 1, page 95) in the context of data. In Grade 2, the emphasis shifts towards more formal representations, i.e., graphing. **ESSENTIAL UNDERSTANDINGS** • Categorical data results from sorting objects into two or three categories. • Data can be organized in more than one way. • Data can be represented (recorded with models, drawings, or graphic organizers) in more than one way. • Data can be interpreted in more than one way. o Addition, subtraction, and comparison are used to answer questions. **MATHEMATICAL THINKING** • Recognize attributes of objects. • Organize, represent, and interpret data. • Pay attention to and make sense of quantities. • Informally explain mathematical reasoning. • Use mathematical language appropriate to the grade level. *Continued on next page*

Expectations for Learning, continued

INSTRUCTIONAL FOCUS

- Sort up to 20 objects (1.OA.2) into as many as three categories.
- Organize real objects into a graph.
- Explore using manipulatives to represent quantities.
- Explore and record data using models, drawings, or graphic organizers.
- Interpret data verbally to answer questions about the following:
  - the total number of data points;
  - the number of data points in each category; and
  - the number of data points in one category (more or less) compared to another. See Table 1, page 95.

Content Elaborations

- Ohio's K-8 Critical Areas of Focus, Grade 1, Number 3, page 10
- Ohio's K-8 Learning Progressions, Measurement and Data, pages 12-14

CONNECTIONS ACROSS STANDARDS

- Using addition and subtraction within 20 to solve word problems involving all situations types. See Table 1, page 95. (1.OA.1).
- Solve word problems that call for addition of the whole numbers whose sum is less than or equal to 20 (1.OA.2).
- Determine the unknown whole numbers in an addition or subtraction equation relating three whole numbers (1.OA.8).
- Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparison with the symbols >, =, and < (1.NBT.3).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

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Instructional Tools/Resources

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STANDARDS	MODEL CURRICULUM
GEOMETRY **Reason with shapes and their attributes.** **1.G.1** 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. **1.G.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. Students do not need to learn formal names such as "right rectangular prism." **1.G.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 in real-world contexts. Understand for these examples that decomposing into more equal shares creates smaller shares.	**Expectations for Learning** In Kindergarten, students identified and described shapes. In Grade 1, students transition to composing and reasoning with shapes and their attributes. They distinguish between defining attributes and non-defining attributes. Students explore fraction concepts through the partitioning of shapes in real-world contexts. In Grade 2, students will use formal language (e.g., sides, vertices) to recognize and identify shapes, and work with fraction concepts through the partitioning of shapes. Students are working at van Hiele Level 0 (Visualization) and moving toward Level 1 (Analysis). **ESSENTIAL UNDERSTANDINGS** • Rectangles, squares, trapezoids, and triangles are two-dimensional closed shapes having straight sides that meet at corners. • Circles can be decomposed into half-circles and quarter-circles. • Shapes have defining and non-defining attributes. • Shapes can be represented through models and drawings using defining attributes. • Color, size, and orientation are non-defining attributes. • Shapes can be combined to form larger shapes: o two-dimensional shapes with two-dimensional shapes o three-dimensional shapes with three-dimensional shapes • When dividing a shape into equal shares, the pieces all need to represent the same amount. • As the number of equal shares in a shape increases, the size of each equal share decreases, e.g., Haves are larger than fourths. • As the number of equal shares in a shape decreases, the size of each equal share increases, e.g., Quarters are less than halves. *Continued on next page*

Expectations for Learning, continued

MATHEMATICAL THINKING

- Explain using informal mathematical reasoning.
- Use mathematical language appropriate to the grade level.
- Use spatial reasoning.
- Create models and drawings to represent shapes.
- Recognize and use a pattern or structure.
- Use real-world contexts to partition circles and rectangles.

INSTRUCTIONAL FOCUS

Composing

- Distinguish between defining attributes and non-defining attributes.
- Explore classifying shapes based on defining attributes.
- Create a composite shape from two-dimensional shapes.
- Compose new shapes from composite two-dimensional shapes.
- Create a composite shape from three-dimensional shapes.
- Compose new shapes from composite three-dimensional shapes.

Partitioning

- Explore and describe part-whole relationships.
- Relate two or four equal shares to circles and rectangles.
- Describe equal shares using the terms *halves, fourths, quarters* and the phrases *half of, fourth of, quarter of* in real-world contexts.
- Explore the decomposition of shapes into halves and fourths; decomposing them into more equal shares creates smaller shares.
- Explore and explain which figures are correctly partitioned into halves or fourths.

Continued on next page

	Content Elaborations • Ohio's K-8 Critical Areas of Focus, Grade 1, Number 4, page 11 • Ohio's K-8 Progressions, K-5 Geometry, page 11 **CONNECTIONS ACROSS STANDARDS** • A half circle is related to half hour (1.MD.3).

INSTRUCTIONAL SUPPORTS FOR THE MODEL CURRICULUM

Instructional Strategies

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Instructional Tools/Resources

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