Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

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.

Common Misconceptions

Many children misunderstand the meaning of the equal sign. The equal sign means "is the same as" but most primary students believe the equal sign tells you that the "answer is coming up" to the right of the equal sign. This misconception is over-generalized by only seeing examples of number sentences with an operation to the left of the equal sign and the answer on the right. First graders need to see equations written multiple ways, for example 5 + 7 = 12 and 12 = 5 + 7. Students may believe that addition is always "put together" and subtraction is always "take away". By moving the unknown to a variety of positions, students will not be limited to this understanding. They will be able to solve for the change in numbers and the initial unknown.

Academic Vocabulary/Language

- part
- add
- whole
- equals =
- sum
- plus +
- number sentence
- subtract
- difference
- minus −

Tier 2

- solve
- compare
- represent

Learning Targets	I can solve word problems using addition and subtraction within 20 and explain my thinking. I can solve four types of problems: add to, take from, put together/take apart, and compare with an unknown in any position. I can create a drawing, a model using objects, or an equation to help me solve problems.

Assessment of Learning

- Students will solve addition and subtraction word problems within 20.
- Students will understand that the unknown can be in different positions within an addition or subtraction situation.
- Students will use manipulatives, drawings and models to represent addition and subtraction word problems within 20.
- Students will represent addition and subtraction word problems within 20 by writing equations containing a symbol for the unknown.

Sample Questions/Activities

1. I have a vase with 15 flowers. Mom put more flowers in the vase. Now there are 19 flowers in the vase. How many flowers did Mom put into the vase?
2. Makenna has 8 stickers. How many can she put in her red notebook and how many can she put in her blue notebook? Explain your thinking.
3. Mrs. Lewis wrote the following equation on the board: ▲ + 8 = 20. Write a story problem that could be solved using this equation.
4. Give students a whiteboard, dry erase marker and a sticky note with a "?" written on it. Read a variety of addition and subtraction word problems within 20 out loud and ask students to write an equation on their whiteboard to represent the story problem, using the "?" sticky note to represent the unknown.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Collaborate in small groups to develop problem-solving strategies using a variety of models such as drawings, words, and equations with symbols for the unknown numbers to find the solutions. Additionally students need the opportunity to explain, write and reflect on their problem-solving strategies. Allow time for students to share their strategies as a whole class. This allows students to see that while there is only one correct answer, there are many strategies that can be used to find the correct answer. The goal for students is to find a strategy for solving addition and subtraction word problems that is efficient and accurate. The situations for the addition and subtraction story problems should involve sums and differences less than or equal to 20 using the numbers 0 to 20. They need to align with the addition and subtraction situations found in Table 1 of the Ohio Department of Education Model Curriculum 2017.

TABLE 1. COMMON ADDITION ADDITION AND SUBTRACTION SITUATIONS.

	RESULT UNKNOWN	CHANGE UNKNOWN	START UNKNOWN
ADD TO	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
TAKE FROM	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	TOTAL UNKNOWN	**ADDEND UNKNOWN**	**BOTH ADDENDS UNKNOWN[1]**
PULL TOGETHER/ TAKE APART[2]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	DIFFERENCE UNKNOWN	**BIGGER UNKNOWN**	**SMALLER UNKNOWN**
COMPARE[3]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

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

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).

K.OA.2 (Prior Grade Standard)	**2.OA.1 (Future Grade Standard)**
Solve addition and subtraction problems (written or oral), and add and subtract within 10 by using objects or drawings to represent the problem.	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. See Table 1 of the Standards.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.)

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.

Common Misconceptions

A misconception that many students have is that it is valid to assume that a key word or phrase in a problem suggests the same operation will be used every time. For example, they might assume that the word left always means that subtraction must be used to find a solution. Providing problems in which key words like this are used to represent different operations is essential. For example, the use of the word left in this problem does not indicate subtraction as a solution method: Seth took the 8 stickers he no longer wanted and gave them to Anna. Now Seth has 11 stickers left. How many stickers did Seth have to begin with? Students need to analyze word problems and avoid using key words to solve them.

Academic Vocabulary/Language

- part
- add
- whole
- equals =
- sum
- plus +
- number sentence

Tier 2

- solve
- compare
- represent

Learning Target	I can solve word problems with three addends that have a sum less than or equal to 20, with a symbol for the unknown and explain my thinking. I can create a drawing, a model using objects, or an equation to help me solve problems.

Assessment of Learning

- Students will solve word problems with three addends and a sum of less than or equal to 20.
- Students will use manipulatives, drawings and models to represent addition word problems within 20.
- Students will represent addition word problems within 20 by writing equations containing a symbol for the unknown.
- Students will understand that the drawings used to solve word problems just represent the mathematics and do not need to be detailed. For example, squares could be used to represent the toy cars in a story problem rather than actual drawings of toy cars.

Sample Questions/Activities

1. Chloe has 6 animal stickers, 3 star stickers, and 7 cat stickers. How many stickers does Lucy have? Explain your thinking.
2. Brendan packed 20 gummy bears for his snack. He has 7 red bears, some green bears and 9 yellow bears. How many green gummy bears does Brendan have? How do you know?
3. Clark read a story problem and wrote down the equation 2 + ▲ + 9 = 15. Write a story problem that could be solved using the equation that Clark wrote.
4. Lila solved the problem 3 + 9 + 7 by adding 3 + 7 first and then adding 9. Is Lila allowed to add the numbers out of order? Why or why not?

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students must begin to understand that equations and story problems can involve more than two addends. Students need the opportunity to write and solve story problems involving three addends with a sum that is less than or equal to 20. For example, each student writes or draws a problem in which three whole things are being combined. The students exchange their problems with other students, solving them individually and then discussing their models and solution strategies. Now both students work together to solve each problem using a different strategy. Encourage students to use manipulatives and drawings to solve these problems. Students should understand that the drawings they use to solve the problem represent the mathematics in the problem and therefore do not need to be detailed. Remind students that their goal is to have a problem solving strategy that is both accurate and efficient. Creating detailed, complex drawings to represent the mathematics in a story problem is not efficient.

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).

K.OA.2 (Prior Grade Standard)	**2.OA.1 (Future Grade Standard)**
Solve addition and subtraction problems (written or oral), and add and subtract within 10 by using objects or drawings to represent the problem.	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions,e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- 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.

Common Misconceptions

A common misconception is that the commutative property applies to subtraction. After students have discovered and applied the commutative property for addition, ask them to investigate whether this property works for subtraction. Have students share and discuss their reasoning and guide them to conclude that the commutative property does not apply to subtraction.

Academic Vocabulary/Language

- add
- part
- whole
- equals =
- sum
- plus +
- number sentence
- subtract
- difference
- minus −

Tier 2

- apply

Learning Targets	I can change the order of the addends in an addition problem and the sum will stay the same. (Commutative Property). I can change the order that I put together addends in an addition problem and the sum will stay the same. (Associative Property). I can explain the properties of addition.

Assessment of Learning

- Students will demonstrate an understanding of the Commutative Property by proving that, in an addition problem, the order of the addends doesn't change the sum.
- Students will demonstrate an understanding of the Associative Property by proving that, in an addition problem, the grouping of the addends doesn't change the sum.
- Students will use informal language to explain the properties of addition (e.g., "Order doesn't matter when you add" or "I can look for addends that make 10 first.").
- Students will understand that the Commutative Property does not apply to subtraction.
- Students will understand that addition and subtraction have an inverse relationship.

Sample Questions/Activities

1. Mr. Burrows has a bowl of jelly beans on his desk. There are 5 red jelly beans, 4 green jelly beans, and 5 black jelly beans. How many total jelly beans are in the bowl on Mr. Burrows' desk? Explain your thinking.
2. Mrs. Hamilton displayed the following problem: 6 + 2 + 4 = ?. Liza solved the problem by solving 6 + 2 = 8 and then adding 8 + 4 to get an answer of 12. Alexander solved the problem by solving 6 + 4 = 10 and then adding 2 + 10 to get an answer of 12. Who has the best strategy? Why do you think so?
3. Cameron said that order doesn't matter when you add numbers but it DOES matter when you subtract numbers. Do you agree or disagree? Why?
4. How could you use the fact 3 + 8 = 11 to solve the problem 11 - ▲ = 3? Explain.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

One focus in this cluster is for students to discover and apply the commutative and associative properties as strategies for solving addition problems. Students do not need to learn the names for these properties. It is important for students to share, discuss and compare their strategies as a class. The second focus is using the relationship between addition and subtraction as a strategy to solve unknown-addend problems. Students naturally connect counting on to solving subtraction problems. For the problem "15 – 7 =?" they think about the number they have to add to 7 to get to 15. First graders should be working with sums and differences less than or equal to 20 using the numbers 0 to 20.

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).

K.OA.3 (Prior Grade Standard) Decompose numbers and record compositions for numbers less than or equal to 10 into pairs in more than one way by using objects and, when appropriate, drawings or equations.	**2.NBT.5 (Future Grade Standard)** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understanding

- The relationship between addition and subtraction allows solving for unknowns in any position.

Common Misconceptions

Students do not understand that unknowns can be found in any position. Often students are only exposed to equations with the unknown after the equals sign. (i.e. 10 - 8 = ?) Students should be exposed to strategies for solving unknowns in all positions. (8 + ? = 10 can be solved by using 10 - 8 = ?)

Academic Vocabulary/Language

- part
- add
- whole
- equals =
- sum
- plus +
- number sentence
- subtract
- difference
- minus −
- addends

Tier 2

- apply
- solve

Learning Target	I can solve a subtraction problem, with an unknown in any position, by using what I know about addition. I can explain that addition and subtraction are inverse operations.

Assessment of Learning

- Students will understand that addition is putting together and subtraction is taking apart.
- Students will understand that addition and subtraction have an inverse relationship.
- Students will use addition to solve a subtraction problem. For example, 8 - 5 = ? can be thought of as 5 + ? = 8.
- Students will understand that some numbers form a number bond through addition and subtraction. For example, 2, 3 and 5 form a number bond (or fact family): 2 + 3 = 5, 3 + 2 = 5, 5 - 2 = 3 and 5 - 3 = 2.

Sample Questions/Activities

1. Play a game of Number Bond Flash with your students. Show number bonds with different unknowns and ask students to determine the missing number. Share students' strategies for solving for the unknown.
2. Mr. Washington asked his first graders to solve the problem 18 - 7 = ? Georgia drew 18 circles, crossed out 7 circles and counted what was left. Paige started at 7 and counted up to 18. Which strategy is the best? Why do you think so?
3. Marsha said if she knows all of the addition facts up to 20 she also knows all of the subtraction facts up to 20. Do you agree or disagree? Why?
4. Francisco was making cards for his 12 friends. He already made 4 cards. How many cards does Francisco still need to make? Explain.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Provide multiple opportunities for students to study the relationship between addition and subtraction in a variety of ways, including games, modeling and real-world situations. Engage students in story problems with the unknown in different positions, part-whole activities, and creating a model to represent a given equation. Students need to understand that addition and subtraction are related, and that subtraction can be used to solve problems where the addend is unknown. Work with number bonds and part-part-whole cards can help students to build fluency with related addition and subtraction facts.

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).

K.OA.4 (Prior Grade Standard)	**2.OA.2 (Future Grade Standard)**
For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or, when appropriate, an equation.	Fluently [G] add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. See standard 1.OA.6 for a list of mental strategies.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

1.OA.5 Relate counting to addition and subtraction, e.g., by counting on[G] 2 to add 2.	**Common Misconceptions** Students understand the concept of addition and subtraction as it pertains to counting concrete objects. Teachers need to provide instructional experiences so that students progress from the concrete level (manipulatives), to the pictorial level, then to the abstract (expressions/equations) level when learning mathematical concepts. This progression allows students to grasp the concept of counting on and counting back as it relates to addition and subtraction.	**Academic Vocabulary/Language** ▪ count on ▪ count back ▪ equals = ▪ sum ▪ plus + ▪ number sentence ▪ difference ▪ minus – ▪ addends ▪ number line **Tier 2** ▪ explain
Essential Understandings ● Addition occurs when counting forward. ● Subtraction occurs when counting back. ● Addition and subtraction are related (inverse operations).		

Learning Target	I can explain how counting forward relates to addition. I can explain how counting backward relates to subtraction.

Assessment of Learning

- Students will count on to solve an addition problem. For example, to solve 5 + 2, students will start at 5 and count forward two numbers (6, 7) to get the answer.
- Students will count back to solve a subtraction problem. For example, to solve 8 - 5, students will start at 8 and count back 5 numbers (7, 6, 5, 4, 3) to get the answer.

Sample Questions/Activities

1. Give students 12 counters and a notecard. Ask students to cover up 3 of the counters with a notecard. Ask students, "How many total counters are there? How many counters are under the notecard?" Model for students counting on from 3 by saying "3...4, 5, 6, 7, 8, 9, 10, 11, 12. Repeat with other numbers of counters under the notecard.
2. Give students a whiteboard, dry erase markers, a number cube and counters. Ask students to roll the number cube and write that number on the whiteboard. Then ask students to grab a handful of counters. Have students start at the number on the whiteboard and count on using the counters. Have students roll again and repeat.
3. Luna put 6 counters in a ten frame. How many more counters does Luna need to fill her ten frame? How do you know?
4. Bella had 19 balloons. Some of them popped. Now Bella has 11 balloons. How many balloons popped? How could you model this problem situation using a number line? Explain your thinking.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Provide numerous opportunities for students to use the counting on strategy for solving addition and subtraction problems. For example, provide a ten frame showing 5 colored dots in one row. Students add 3 dots of a different color to the next row and write 5 + 3. Ask students to count on from 5 to find the total number of dots. Then have them add an equal sign and the number eight to 5 + 3 to form the equation 5 + 3 = 8. Ask students to verbally explain how counting on helps to add one part to another part to find a sum. Explain to students that counting on or counting back is one more problem solving strategy they could use to solve addition and subtraction problems. Students should develop strategies that are accurate, efficient and flexible.

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).

K.OA.2 (Prior Grade Standard)	**2.OA.2 (Future Grade Standard)**
Solve addition and subtraction problems (written or oral), and add and subtract within 10 by using objects or drawings to represent the problem.	Fluently [G] add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. See standard 1.OA.6 for a list of mental strategies.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- Addition and subtraction are related (inverse operations).
- Fluency means being efficient, accurate, and flexible with addition and subtraction strategies.

Common Misconceptions

Students often do not realize that there are many different ways to solve addition and subtraction equations. By giving students manipulatives and math tools such as ten frames and number lines, they can explore the different ways to add and subtract numbers. Once students are successful using the manipulatives/tools, they can move to pictorial and then numerical representations. When students show an understanding of the relationships between addition and subtraction they can choose efficient strategies to demonstrate fluency.

Academic Vocabulary/Language

- equals =
- sum
- plus +
- number sentence
- difference
- minus −
- addends

Tier 2

- compare

Learning Targets	I can use a variety of strategies for adding and subtracting numbers within 20 and explain my reasoning. I can fluently add and subtract numbers within 10 by using strategies.

Assessment of Learning

- Students will accurately add and subtract within 20.
- Students will demonstrate fluency with a variety of addition and subtraction strategies within 10.
- Students will have strategies for addition and subtraction that are accurate, efficient and flexible.

Sample Questions/Activities

1. Pose different story problems using the addition and subtraction situations found in Table 1 of the Ohio Department of Education Model Curriculum 2017. For example, "Some dogs were at the dog park. 4 dogs left the dog park. Now there are 11 dogs at the dog park. How many dogs were at the dog park before? Explain." Have students share their strategies and solutions for the problems. Discuss as a class that although there is only one correct answer to an addition or subtraction problem, there are a variety of strategies that can be used to find the correct answer. Encourage students to find strategies for addition and subtraction that are accurate and efficient.
2. Pose different story problems using the addition and subtraction situations found in Table 1 of the Ohio Department of Education Model Curriculum 2017. For example, "Some birds were at the bird feeder. 12 more birds came to the bird feeder. Now there are 16 birds at the bird feeder. How many birds were at the bird feeder before? Explain." Ask students to solve the story problem using two different strategies. Have students share their strategies and solutions with a partner. Discuss what strategies they liked best and why.
3. How could knowing that $6 + 6 = 12$ help you to solve the problem $6 + 7 = ?$ Explain.
4. Explain how to use the "making ten" strategy to help you solve the following problem: $2 + 6 + 4 + 8 + 1 = ?$

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Provide multiple and varied experiences that will help students develop a strong sense of numbers based on comprehension – not rules and procedures. Number sense is a blend of comprehension of numbers and operations and fluency with numbers and operations. Students gain computational fluency (using efficient and accurate methods for computing) as they come to understand the role and meaning of arithmetic operations in number systems. By observing and critiquing their peers' strategies, students can discover which strategies work well for them. Hearing about a strategy from a peer makes a student much more likely to investigate whether or not that strategy works for them, versus a teacher-shared strategy that may be viewed as the "right way" or the "only way".

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).

K.OA.5 (Prior Grade Standard)	**2.OA.2 (Future Grade Standard)**
Fluently [G] add and subtract within 5.	Fluently [G] add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. See standard 1.OA.6 for a list of mental strategies.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

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.

Common Misconceptions

Many children misunderstand the meaning of the equal sign. The equal sign means "is the same as" but most primary students believe the equal sign tells you that the "answer is coming up" to the right of the equal sign. This misconception is over-generalized by only seeing examples of number sentences with an operation to the left of the equal sign and the answer on the right. First graders need to see equations written multiple ways, for example 5 + 7 = 12 and 12 = 5 + 7. Students may believe that addition is always "put together" and subtraction is always "take away". By moving the unknown to a variety of positions, students will not be limited to this understanding. They will be able to solve for the change in numbers and the initial unknown.

Academic Vocabulary/ Language

- true
- false
- equals =
- sum
- plus +
- equation
- difference
- minus −
- addends

Tier 2

- solve
- explain

Learning Targets	I understand that the equal sign means the quantities on both sides of the equation have the same value and can represent it by using a model. I can determine if an equation is true or false even when written in a variety of ways and justify my answer.

Assessment of Learning

- Students will understand the meaning of the equal sign. They will understand that the equal sign represents balance, or that both sides of the equation represent the same value.
- Students will be able to determine whether or not equations are true or false.
- Students will understand that an equation is not always formatted as a + b = answer (or a - b = answer), but that a variety of number sentences can be on either side of the equal sign as long as both sides represent the same value.

Sample Questions/Activities

1. Does 4 + 2 = 5 + 1? How do you know?
2. Mr. Jackson asked his first graders to write down an addition equation equal to 10. When Mr. Jackson looked at what the 5 students at Table Two had written, they each wrote down a different addition equation equal to 10. What equations could the students at Table Two have written down? Are there more correct answers? How do you know?
3. Play the game Two Truths and a False with your students. Display three different equations (2 that are true and 1 that is false). Vary what is on either side of the equal sign (e.g., 7 = 7, 4 + 1 = 3 + 3, 7 = 8 - 1). Ask students to determine and prove which equations are true and which is false.
4. Mike and Jo were comparing their collection of toy cars. Mike has 3 red cars, 7 blue cars and 4 white cars. Jo has 2 blue cars, 11 green cars and 1 purple car. Do Mike and Jo have the same total number of cars? How do you know?

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Provide opportunities for students to explore the meaning of the equal sign. Writing the sum or difference on the left side of the equal sign is a simple way to introduce the idea of the equal sign as an indicator that both sides represent the same value rather than the equal sign indicating the answer comes next. For example, use weights and a number balance to model equations for sums and differences less than or equal to 20 using the numbers 0 to 20. Give students equations in a variety of forms that are true and false. Include equations that show the identity property, commutative property of addition, and associative property of addition. Students need not use formal terms for these properties.

13 = 13 Identity Property; 8 + 5 = 5 + 8 Commutative Property for Addition; 3 + 7 + 4 = 10 + 4 Associative Property for Addition

Ask students to determine whether the equations are true or false and to record their work with drawings. Students then compare their answers as a class and discuss their reasoning.

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).

K.OA.1(Prior Grade Standard)	**2.NBT.4 (Future Grade Standard)**
Represent addition and subtraction with objects, fingers, mental images, drawings, sounds such as claps, acting out situations, verbal explanations, expressions, or equations. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

1.OA.8

Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = – 3, 6 + 6 = .

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.
- The relationship between three numbers, such as number bonds or fact families, can be used to solve problems.

Common Misconceptions

Many children misunderstand the meaning of the equal sign. The equal sign means "is the same as" but most primary students believe the equal sign tells you that the "answer is coming up" to the right of the equal sign. This misconception is over-generalized by only seeing examples of number sentences with an operation to the left of the equal sign and the answer on the right. First graders need to see equations written multiple ways, for example 5 + 7 = 12 and 12 = 5 + 7. Students may believe that addition is always "put together" and subtraction is always "take away". By moving the unknown to a variety of positions, students will not be limited to this understanding. They will be able to solve for the change in numbers and the initial unknown.

Academic Vocabulary/Language

- addends
- equals =
- sum
- plus +
- equation
- difference
- minus −

Tier 2

- solve
- explain

Learning Target	I can solve for the unknown in any equation that has two other numbers given in an addition or subtraction equation and explain the strategy .

Assessment of Learning

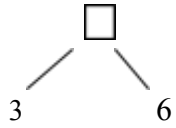
- Students will solve for the unknown in an addition or subtraction equation regardless of the position of the unknown.
- Students will understand that the equal sign indicates that both sides of an equation represent the same value.
- Students will use their understanding of the relationship between addition and subtraction to solve equations.

Sample Questions/Activities

1. 5 = _ – 3 Show your work.
2. 8 + ? = 11 Explain your thinking.
3. Five cookies were on the table. I ate some cookies. Then there were 3 cookies. How many cookies did I eat?
4. Use the digits 3, 4, 5, 6 and 7 to make the equations true. __ + 6 = 12 5 - __ = 2 4 = __ - 3 6 = 2 + __ 13 - ___ = 8

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Understanding that the equal sign represents that both sides of an equation have the same value allows students to determine the unknown in an equation regardless of its position. Knowledge of sets of numbers related through addition and subtraction (fact families) can also help students solve for the unknown in any position. The Math Mountain (or Number Bond) shows a sum with diagonal lines going down to connect with the two addends, forming a triangular shape. It shows two known quantities and one unknown quantity. Use various symbols, such as a square, to represent an unknown sum or addend in a horizontal equation. For example, here is a Take from / Start Unknown problem situation such as: Some markers were in a box. Matt took 3 markers to use. There are now 6 markers in the box. How many markers were in the box before? The teacher draws a square to represent the unknown sum and diagonal lines to the numbers 3 and 6.



Have students practice using the Math Mountain (or Number Bond) to organize their solutions to problems involving sums and differences less than or equal to 20 with the numbers 0 to 20. Then ask them to share their reactions to using the Math Mountain (or Number Bond).

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).

K.OA.2 (Prior Grade Standard)	**2.OA.1 (Future Grade Standard)**
Solve addition and subtraction problems (written or oral), and add and subtract within 10 by using objects or drawings to represent the problem.	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- Rote counting is a repeating pattern.
- The cardinality of a group is the total number of objects in the group.

Common Misconceptions

Students sometimes recognize counting as a pattern much like singing the alphabet. This pattern can be memorized but may not be understood. Students who have done this can have difficulty counting on from a number other than 1. These students may also have difficulty counting backwards. When counting backwards, ask students to start at 24 and count back to 15. Listen to see if they can make the jump over the decade from 20 to 19.

Academic Vocabulary/Language

- ten
- one
- hundred
- numeral

Tier 2

- count
- write

Learning Targets	I can count to 120 starting with any number less than 120 by relating it to the patterns of numbers. I can explain my thinking when I count by ones and tens in a sequence up to 120. I can read and write any of the numbers up to 120 by applying the patterns of numbers. I can connect a number with a group of objects and write the numeral that represents the amount.

Assessment of Learning

- Students will count to 120, starting from any number 0 - 120.
- Students can count by ones and tens up to 120.
- Students can read and write any of the numbers up to 120.
- Students will represent a number of objects using a written numeral up to 120.

Sample Questions/Activities

1. Display a 1 - 120 chart. Have one student randomly choose a starting number by pointing to a number on the chart. Have the class start counting at the number chosen and stop when they reach 120. Have another student choose a different starting number and repeat.
2. Put students into groups of 2-3. Give each group a pile of 100 - 120 math tools. Ask students to first count the math tools by ones. Then give students small cups. Ask students to count the math tools a second time, putting groups of ten math tools in each cup. Have students recount the tools by tens and any leftover ones. Discuss which way of counting is more efficient and what skip counting represents.
3. Give students multiple sets of math tools. Have the number of tools vary in each group between 20 and 120. Have students count the number of objects in each group and write the number that represents the total number of objects in the group.
4. Michelle wanted to know the total number of paper clips she had in her desk drawer. She counted 21 in one part of the drawer and 39 in another part of the drawer. Then she counted 4 more paper clips hidden under a piece of paper. What numbers did Michelle say as she counted the last 4 paper clips? How do you know?

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

In this grade, students build on counting to 100 by ones and tens beginning with numbers other than 1 as they learned in Kindergarten. Students can start counting at any number less than 120 and continue to 120. It is important for students to connect different representations for the same quantity or number. Students use materials to count by ones and tens to build models that represent a number, then they connect this model to the number word and its representation as a written numeral. Students use their understanding of cardinality to know the last number word said when counting represents the total number of objects counted. Students should explore both numeral patterns and number word patterns as they work with numbers 0 - 120.

Connections Across Standards

Understand the patterns of ones, tens, and hundreds (1.NBT.2).
Use pennies and dimes to count (1.MD.3).

K.CC.1 (Prior Grade Standard)	**2.NBT.2 (Future Grade Standard)**
Count to 100 by ones and by tens.	Count forward and backward within 1,000 by ones, tens, and hundreds starting at any number; skip-count by 5s starting at any multiple of 5.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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).

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.

Common Misconceptions

Students may struggle with the concept of place value and how to break numbers apart. They may not see that a bundle of ten ones is the same as a ten or that numbers 10, 20, etc. can be identified as 10 ones or a group of ten, 20 ones or two groups of ten.

Academic Vocabulary/Language

- tens
- ones
- digit
- zero
- group
- bundle

Tier 2

- represent
- explain

Learning Targets	I can explain how ten "ones" can be grouped together and given a new name of "ten" by creating a model. I can explain how the teen numbers are formed by one "ten" and a given number of "ones" and connect it to a model. I can explain how 10, 20, 30, 40, 50, 60, 70, 80, and 90 are made from a given number of "tens" and zero "ones".

Assessment of Learning

- Students will understand that ten ones bundled together is called "a ten".
- Students will understand that a two digit number has two digits because the number is made up of one ten and some more ones.
- Students will understand that the numbers 11-19 are made up of one ten and a given number of ones (e.g., 16 is made up of one ten and 6 ones).
- Students will understand that the numbers 10, 20, 30, 40, 50, 60, 70, 80 and 90 are made up of a given number of tens and zero ones.

Sample Questions/Activities

1. Are 19 and 91 the same or different? How do you know?
2. Why does the number 7 have one digit and the number 17 have two digits? What does each digit represent and how do you know?
3. Mark placed his counters into ten frames. He filled 3 ten frames and had 4 counters in another ten frame. How many total counters does Mark have? How many more counters does Mark need to fill the last ten frame? How many total counters will Mark have then? Explain.
4. Ask students, "Why do numbers like 20 or 30 have a zero as the second digit? What does this represent?" Give students ten frames and counters and let them compare the ten frame models of multiples of ten to the ten frame models of other numbers. Discuss how all of the tens have no leftover ones. Then completely fill the ten frames with 0 ones leftover.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The beginning concepts of place value are developed in Grade 1 with the understanding of ones and tens. The major concept is that putting ten ones together makes a "ten" and that there is a way to write that down so the same number is always understood. This understanding lays the foundation for a conceptual understanding of place value. Students move from counting by ones, to creating groups and ones, to tens and ones. Students should both compose and decompose two digit numbers into tens and ones. It is essential at this grade for students to see and use multiple representations of making tens using base-ten blocks, bundles of tens and ones, and ten-frames. Making the connections among the representations, the numerals and the words are very important. Students need to connect these different representations for the numbers 0 to 99.

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).

K.NBT.1 (Prior Grade Standard)	**2.NBT.1 (Future Grade Standard)**
Compose and decompose numbers from 11 to 19 into a group of ten ones and some further ones by using objects and, when appropriate, drawings or equations; understand that these numbers are composed of a group of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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 <.

Essential Understandings

- 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.

Common Misconceptions

The use of the learning aids (such as alligator mouth) must be accompanied by the connection to the symbols: < (less than), > (greater than), and = (equal to). More importantly, students need to begin to develop the understanding between comparing numbers and place value. In Grade 1, it means that this number has more tens, or the same number of tens, but with more ones, making it greater. Students need to begin to understand that both inequality symbols (< , >) can create true statements about any two numbers where one is greater/smaller than the other, (15 < 28 and 28 >15).

Academic Vocabulary/Language

- greater than
- less than
- equal to
- group of
- digit
- ones
- <
- >
- =

Tier 2

- compare

Learning Targets	I can create a model and apply my understanding of numbers to compare two numbers from 10 to 99 and say how many "tens" and how many "ones" each number has. I can apply what I know about numbers to compare two numbers from 10 to 99 and write the correct number sentence with symbols to compare them and explain my thinking.

Assessment of Learning

- Students will compare two numbers from 10 to 99, using the number of tens and ones to make the comparison.
- Students will write a number sentence using the symbols >, <, or = to record the results of the comparison.
- Students will understand that if one number has more tens than another number, that number is greater regardless of the number of ones.
- Students will understand that place determines value. In other words, the numeral 3 has a value of 3 when it is in the ones place, but has a value of 30 when it is in the tens place.

Sample Questions/Activities

1. Give students ten frames and counters. Ask students to use the ten frame models to compare two two-digit numbers. Ask students to build a model of each number and use what they see to explain how the numbers compare. For example, when students compare 42 and 35, students might say, "42 is greater than 35 because 42 has 4 tens and 35 only has 3 tens". Repeat with other numbers. Ask students to compare two numbers with the same digit in the tens place (e.g., 57 and 51) as well as two numbers with the same digit in the ones place (e.g., 29 and 39).
2. Brian needs to place the following numbers in order from least to greatest: 49, 7, 22, 98, and 3. How should Brian place the numbers in the correct order? Choose two of the numbers and use the symbols >, <, or = to record how they compare.
3. What is the value of the 3 in the numbers 31 and 53? Why does the value of the 3 change? Use models and words to explain.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students need to move through a progression of representations to learn a concept. They start with a concrete model, move to a pictorial or representational model, then an abstract model. For example, ask students to place a handful of small objects in one region and a handful in another region. Next have them draw a picture of the objects in each region. They can draw a likeness of the objects or use a symbol for the objects in their drawing. Now they count the physical objects or the objects in their drawings in each region and use numerals to represent the two counts. They also say and write the number word. Now students can compare the two numbers using an inequality symbol or an equal sign. Students should begin to understand that a numeral's place determines its value. The numeral 4 in the tens place has a value of 40 because it represents four tens or 4 groups of 10. If that same numeral 4 is in the ones place, however, it has a value of 4 because it represents 4 ones or 4 groups of 1. After students have used their understanding of place value to compare two numbers, they should record this comparison using the symbols >, <, or =.

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).

K.NBT.1 (Prior Grade Standard)	**2.NBT.4 (Future Grade Standard)**
Compose and decompose numbers from 11 to 19 into a group of ten ones and some further ones by using objects and, when appropriate, drawings or equations; understand that these numbers are composed of a group of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

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.

Common Misconceptions

Students who have not mastered the concept of place value may struggle with how to break numbers apart to add them. They may not see that when adding two-digit numbers, one adds tens and tens, ones and ones. Sometimes when adding, you must make another ten.

Academic Vocabulary/Language

- add
- regroup
- tens
- ones
- one-digit number
- two-digit number

Tier 2

- explain
- compose a ten

Learning Targets	I can apply my understanding of place value, properties of operations and the relationship between addition and subtraction. I can use models, drawings, or equations to explain how I added two numbers from 0 to 100 (two-digit + one-digit or two-digit + multiple of ten). I can record my strategy using a drawing or equation and explain my strategy. I can add two numbers from 0 to 100 (two-digit + one-digit or two-digit + multiple of 10) and can explain how it is sometimes necessary to take ten "ones" and regroup/rename as "ten".

Assessment of Learning

- Students will add two numbers from 0 to 100. Students are only expected to add a two-digit number plus a one-digit number, or a two-digit number plus a multiple of 10.
- Students will use models, drawings or equations to explain how they added the two numbers.
- Students will record their addition strategy using a drawing or equation.
- Students will understand that tens are added to tens and ones are added to ones.
- Students will understand that sometimes when adding two numbers they may end up with ten ones that need to be regrouped as a ten.

Sample Questions/Activities

1. Eddie added 23 + 5 and got an answer of 53. Jayda solved the same problem and got an answer of 28. Who is correct? What mistake was made by the student who got the answer wrong? Explain.
2. 63 apples are in the basket. Gia put 20 more apples in the basket. How many apples are in the basket? How do you know?
3. 24 red apples and 8 green apples are on the table. How many total apples are on the table? If 10 yellow apples are added to the table, how many total apples will be on the table now? Explain.
4. Solve the problem 68 + 7 using two different strategies. Use models or drawings to explain your strategy.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

When students are adding numbers they should understand that a numeral's place determines its value. Tens should be added to tens and ones should be added to ones. When students add ones to ones, they will sometimes end up with ten (or more!) ones and need to regroup the ten ones into a ten. Students should solve problems using concrete models and drawings to support and record their solutions. Students should record their strategy and solution using models, drawings and equations. It is important for them to share the reasoning that supports their solution strategies with their classmates.

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).

K.NBT.1 (Prior Grade Standard)	**2.NBT.7 (Future Grade Standard)**
Compose and decompose numbers from 11 to 19 into a group of ten ones and some further ones by using objects and, when appropriate, drawings or equations; understand that these numbers are composed of a group of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	Add and subtract within 1,000, 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 in adding or subtracting three-digit numbers, hundreds are added or subtracted from hundreds, tens are added subtracted from tens, ones are added or subtracted from ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.	**Common Misconceptions** Students have difficulty with ten as a singular word that means 10 things. For many students, the understanding that a group of 10 things can be replaced by a single object and they both represent 10 is confusing.	**Academic Vocabulary/Language** ▪ ten ▪ more ▪ less ▪ place value **Tier 2** ▪ explain
Essential Understandings ● 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.		
Learning Target	I can mentally add or subtract 10 from any number from 10 to 99 and explain my reasoning.	

Assessment of Learning

- Students will mentally add or subtract 10 from a number 10 to 99.
- Students will understand that the digit in the ones place will stay the same when adding or subtracting 10.
- Students will understand that the digit in the tens place changes when adding or subtracting 10.

Sample Questions/Activities

1. There are 74 birds in the park. 10 birds fly away. How many birds are in the park now? Explain.
2. Pam said 86 is 10 more than 96. Is she correct? How do you know?
3. Solve the problem 43 + 10 using two different strategies. Explain your strategies using models or drawings. Explain which strategy you think is best and why.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students will usually move to using base-ten concepts, properties of operations, and the relationship between addition and subtraction to invent mental and written strategies for addition and subtraction. Help students share, explore, and record their invented strategies. Recording the expressions and equations in the strategies horizontally encourages students to think about the numbers and the quantities they represent. For example, when solving 23 + 10, students may think of 23 as 20 + 3, adding 20 + 10 to get 30 and then 30 + 3 to get a sum of 33. Encourage students to try the mental and written strategies created by their classmates. Students eventually need to choose efficient strategies to use to find accurate solutions.

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).

K.CC.1 (Prior Grade Standard)	**2.NBT.8 (Future Grade Standard)**
Count to 100 by ones and by tens.	Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- 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.

Common Misconceptions

Students have difficulty with ten as a singular word that means 10 things. For many students, the understanding that a group of 10 things can be replaced by a single object and they both represent 10 is confusing.

Academic Vocabulary/Language

- subtract
- less
- place value

Tier 2

- explain
- relate
- model

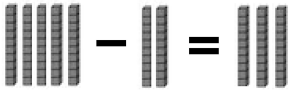
Learning Target	I can subtract multiples of 10 from multiples of 10 (in the range of numbers 10-90), and explain the answer using a model, drawing, and other strategies.

Assessment of Learning

- Students will subtract multiples of 10 (within 10-90) from multiples of 10 in the same range.
- Students will explain their subtraction strategies using models, drawings and other strategies.
- Students will explain the pattern when adding or subtracting multiples of ten and use this pattern to perform this computation mentally.
- Students will explain why only the digit in the tens place and not the digit in the ones place changes when adding or subtracting multiples of 10 from multiples of 10.

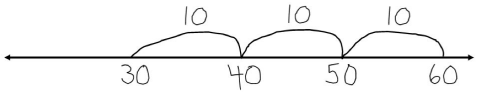
Sample Questions/Activities

1. Use two different strategies to solve the problem 90 - 40. Explain your strategies using models or drawings. Explain which strategy you think is best and why.
2. Kevin is organizing his toy cars into containers. He has 90 toy cars. He puts 40 toy cars in the first container. How many toy cars does Kevin have left to put into another container. Explain.
3. How could you use a number line to model the problem 70 - 60? Explain.
4. Build a model for the number 52 using base ten blocks. How would the model change if we subtracted 30? Explain.
5. 50 - 20 = 30 because . . .. Students could model the problem using base ten blocks such as this.



6. There are 60 students in the gym. 30 students leave. How many students are still in the gym?

60 - 10 = 50
50 - 10 = 40
40 - 10 = 30



Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Encourage students to represent two-digit numbers using proportional models, such as base ten blocks, strips and squares, etc. Building a model of what happens to a number when multiples of ten are added or subtracted will help students to understand why only the digit in the tens place changes. Engage students in different problem solving activities involving two multiples of ten. Have students connect a 0-99 chart or a 1-100 chart to their invented strategy for finding 10 more and 10 less than a given number. Ask them to record their strategy and explain their reasoning.

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).

K.OA.1 (Prior Grade Standard) Represent addition and subtraction with objects, fingers, mental images, drawings, sounds such as claps, acting out situations, verbal explanations, expressions, or equations. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.	**2.NBT.7 (Future Grade Standard)** Add and subtract within 1,000, 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 in adding or subtracting three-digit numbers, hundreds are added or subtracted from hundreds, tens are added or subtracted from tens, ones are added or subtracted from ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.	**Common Misconceptions** Some students may view the measurement process as a procedural counting task. They might count the markings on a ruler rather than the spaces between (the unit of measure). Students need numerous experiences measuring lengths with student-made tapes or rulers with numbers in the center of the spaces.	**Academic Vocabulary/Language** · length · short · long · compare · shorter/shortest · longer/longest **Tier 2** · measure · order
Essential Understandings ● Length is a measurable 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.		

Learning Target	I can order three objects from longest to shortest using one of the objects to compare lengths of the other two.

Assessment of Learning

- Students will understand that length is a measurable attribute.
- Students will compare the lengths of three objects to place the objects in order from shortest to longest.
- Students will understand that objects must be placed at the same endpoint in order to be compared.
- Students will understand that the lengths of two objects can be compared indirectly by using a third object.
- Students will use vocabulary like shorter/shortest or longer/longest to discuss the length comparison.

Sample Questions/Activities

1. Select three school supplies from your desk. Put the objects in order from shortest to longest. Add one more object into your line up. How does it compare to the other objects? Explain.
2. Display a common school object for the class to see (e.g., marker, notebook, pointer, etc.). Ask students to go on a measurement hunt in the room. They need to find an object that is shorter than your object, longer than your object, and about the same length as your object. Share students' findings as a class. Place a few of the objects in order from shortest to longest.
3. The pet store owner is trying to put the hamsters in order from shortest to longest. The black hamster is longer than the gray hamster and the brown hamster is shorter than the gray hamster. In what order should the pet store owner line up the hamsters? Explain.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The measure of an attribute is a count of how many units are needed to fill, cover or match the attribute of the object being measured. Students need to understand what a unit of measure is and how it is used to find a measurement. They need to predict the measurement, find the measurement and then discuss the estimates, errors and the measuring process. It is important for students to measure the same attribute of an object with differently sized units. Comparing the length of objects directly and indirectly helps students begin to develop a deeper understanding of measurement. Informal units and vocabulary such as shorter/shortest or longer/longest can be used to discuss the comparisons.

Connections Across Standards

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

K.MD.2 (Prior Grade Standard)	**2.MD.4 (Future Grade Standard)**
Directly compare two objects with a measurable attribute in common to see which object has "more of" or "less of" the attribute, and describe the difference. *For example, directly compare the heights of two children, and describe one child as taller/shorter.*	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- Objects must be placed at the same endpoint for comparison.
- 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.

Common Misconceptions

Some students may view the measurement process as a procedural counting task. They might count the markings on a ruler rather than the spaces between (the unit of measure). Students need numerous experiences measuring lengths with student-made tapes or rulers with numbers in the center of the spaces.

Academic Vocabulary/Language

- length
- measure
- unit
- whole number

Tier 2

- gap
- overlap

Learning Target	I can measure the length of an object by laying down many copies of a smaller object, end to end. I can show that the length of an object is equal to the number of the copies of a smaller object that are used. I understand that when I lay the copies of a smaller object end to end there can be no gaps or overlaps and explain the reasoning.

Assessment of Learning

- Students will measure the length of an object by laying copies of a smaller object (e.g., paper clips, beans, cubes, etc.) end to end.
- Students will understand that the total number of the copies of a smaller object that are used represents the length of the object.
- Students will understand that the copies of the smaller object must be laid end to end, with no gaps or overlays in order to measure length.
- Students will understand that the smaller objects used to measure must be copies of each other (e.g., both large AND small paper clips cannot be used).

Sample Questions/Activities

1. Give students a nonstandard unit to use to measure length, such as paper clips, straws, cubes, etc. Ask students to find objects in the classroom that measure about a certain length (e.g., 4 straws long). Have students draw a picture to record their findings. Discuss the objects students found as a class. Measure a few objects together to prove they are close to the determined length. Challenge students to find an object that is shorter than the determined length and longer than the determined length.
2. Give students a nonstandard unit to use to measure length, such as paper clips, straws, cubes, etc. Ask students to go around the room and measure the length of a variety of objects. Ask students to make an estimate before they measure the object. After students have finished measuring, discuss their estimates and actual measurements. Ask questions such as, "How did you make your estimate? Did your estimates and actual measurements get closer as you measured more objects? What was the longest object you measured? The shortest?"
3. Ask students to measure the length of their desk using straws (or other similar object). Then ask students, "If we measure the length of our desk again but this time use paper clips, do you think it will take more or less paper clips? Why?" Discuss students' thinking. Allow students to measure the desk with paper clips and discuss their findings. Repeat with other nonstandard units of different sizes.
4. Display a pencil with paper clips measuring the length, but have the paper clips overlapping each other. Ask students, "Is this the correct way to measure the length of a pencil? Why or why not?"

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The use of informal or nonstandard units at this stage of learning helps students to focus on what it means to measure length. Nonstandard units can be selected to keep numbers manageable for first graders. Using a variety of nonstandard units (e.g., paper clips, counters, straws, beans, etc.) will lead to a discussion about the importance of using standard units. Measurement units share the attribute being measured. Students need to use as many copies of the length unit as necessary to match the length being measured. For instance, use large footprints with the same size as length units. Place the footprints end to end, without gaps or overlaps, to measure the length of a room to the nearest whole footprint. Use language that reflects the approximate nature of measurement, such as the length of the room is about 19 footprints. Students need to also measure the lengths of curves and other distances that are not straight lines.

Connections Across Standards

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

K.MD.2 (Prior Grade Standard)	**2.MD.1 (Future Grade Standard)**
Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- Time is a measurable 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.
- A penny is worth 1 cent (1¢).
- A dime is worth 10 cents (10¢).
- The size of a coin does not determine its value.

Common Misconceptions

Students have a difficult time telling the differences between the two hands and how they work. When the hour hand is not directly pointing to a number the students struggle to identify the time. When working with money, students may think that the larger the coin, the greater the value.

Academic Vocabulary/Language

- hour
- hour hand
- minute
- minute hand
- analog clock
- digital clock
- o'clock
- half hour
- penny
- dime
- coin
- value
- cent

Tier 2

- tell
- write

Learning Target	I can identify and write time to the nearest hour or half hour on an analog or digital clock and apply it to real world situations. I can apply my understanding of place value when I name and identify the value of pennies and dimes.

Assessment of Learning

- Students will understand that time is a measurable attribute.
- Students will understand that time is measured in minutes and hours.
- Students will be able to tell time to the nearest hour and half hour using both an analog and digital clock.
- Students will write time to the nearest hour and half hour using a colon to separate hours and minutes.
- Students will recognize and name pennies and dimes.
- Students will understand a penny has a value of 1 cent and a dime has a value of ten cents.
- Students will understand that the size of a coin does not determine its value (e.g. dimes are smaller than pennies in size but have a greater value).

Sample Questions/Activities

1. Observe an analog clock. Draw attention to the hour hand and minute hand. Prove that an hour is 60 minutes and a half hour is 30 minutes. Show students various analog clocks with time to the hour and half hour. Have students write down the times using the format hour:minute.
2. Throughout the school day, focus on using the classroom clock to tell time. Draw attention to the classroom clock on the hour or half hour and ask, "What time is it?" Compare the classroom analog clock time to the digital time posted on your phone. Post a daily schedule with times to the hour and half hour and ask students questions such as, "What time is our read aloud?" or "What time do we start science class?"
3. Give students a pile of coins and ask them to sort the coins into two groups: dimes or pennies. Consider adding other coins into the pile and having students add a third group to the sort called "other coins".
4. Give students a pile of pennies. Explain that pennies have a value of 1 cent. You can use a penny to buy something that is 1 cent. Ask students if they can think of anything that costs 1 cent. Explain that a dime has a value of 10 cents. You can use a dime to buy something that has a value of 10 cents. Ask students, "How many pennies are the same as one dime? How do you know?" Have students count pennies by ones and trade every ten pennies for one dime.
5. The time shown on the clock is 3:30.  Write the times shown on each of these clocks.  
6. Show me the coin that has the same value as 10 pennies? (dime) Which coin is the same as one cent?

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students need to experience a progression of activities for learning how to tell time. Begin by using a one-handed clock to tell times in hour and half-hour intervals, then discuss what is happening to the unseen big hand. Next use two real clocks, one with the minute hand removed, and compare the hands on the clocks. Students can predict the position of the missing big hand to the nearest hour or half-hour and check their prediction using the two-handed clock. They can also predict the display on a digital clock given a time on a one- or two-handed analog clock and vice-versa.

Money can be a very abstract idea for first graders. Recognizing coin names and values doesn't involve problem solving or critical thinking, instead it is just memorization. Students need lots of exposure to coins and their value. Remind students that money has value that allows them to buy things in stores or online. A penny has been assigned a value of 1 cent and a dime has been assigned a value of ten cents. Use play money - pennies and dimes, to count by 1s, and skip count by 10s. Reinforce place value concepts with the values of pennies and dimes.

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).

K.CC.4 (Prior Grade Standard)
Understand the relationship between numbers and quantities; connect counting to cardinality using a variety of objects including pennies.

a. When counting objects, establish a one-to-one relationship by saying the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

2.MD.7 (Future Grade Standard)
Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

2.MD.8 (Future Grade Standard)
Solve problems with money.

a. Identify nickels and quarters by name and value.
b. Find the value of a collection of quarters, dimes, nickels, and pennies.
c. Solve word problems by adding and subtracting within 100, dollars with dollars and cents with cents (not using dollars and cents simultaneously) using the $ and ¢ symbols appropriately (not including decimal notation).

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

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.
    - Addition, subtraction, and comparison are used to answer questions.

Common Misconceptions

The attributes for the same kind of object can vary. This will cause equal values in an object graph to appear unequal. For example, when making bars for an object graph using shoes for boys and girls, five adjacent boy shoes would likely appear longer than five adjacent girl shoes. To standardize the objects, place the objects on the same-sized construction paper, then make the object graph.

Academic Vocabulary/Language

- tally chart
- survey
- data
- graph
- picture
- picture graph
- bar graph
- models
- drawings
- graphic organizers

Tier 2

- organize
- represent
- answer

Learning Targets	I can classify objects into up to three categories to organize data. I can create a simple graph to show data and explain my thinking. I can explore and record data using a model, drawing, or graphic organizer. I can answer questions about the data such as how many in each group, which group has more, which group has less, and what is the total amount of data and justify my answer.

Assessment of Learning

- Students will sort objects into up to three categories. Students will use attributes of the objects to sort.
- Students will understand that data can be recorded and represented.
- Students will understand that organizing data makes the data easier to interpret.
- Students will be able to answer questions about collected data, such as the amount of data in a category, the total amount of data collected, and comparing the size of sorted groups.

Sample Questions/Activities

1. Give students objects to sort into up to three categories. Begin with structured attribute materials, such as color tiles, pattern blocks, attribute blocks, etc. The categories for sorting these materials are easier to see and help students to understand how to organize data. Move onto unstructured materials, such as rocks, seashells, shoes, etc. The categories for sorting these materials are more open ended. Students will have to observe and analyze the objects more closely in order to sort them into categories.
2. Give each student objects to sort into up to three categories. Have students find a partner and share their sorts. Each student must guess the rule for their partner's sort. Try this activity with both structured and unstructured attribute materials.
3. Work together as a class to sort a group of objects into three categories. Ask students, "How could we label each category? What is this graph all about?" Pose different questions about the data and ask students to answer the questions, such as "Which category has the most?" or "How many total objects did we sort?"
4. Robin sorted 12 color tiles into three categories. When he finished, he saw the blue tiles were the biggest category, the red tiles were the smallest category and there were 2 yellow tiles. What could Robin's sort look like? Explain.
5. Collect data by asking the class, for example, what their favorite flavor of ice cream is; Chocolate, Vanilla or Strawberry. Once all of the data is organized, ask students questions about the data such as, What flavor do most people like? How many people liked Vanilla? How many more people need to vote for Strawberry for it to equal Chocolate/?

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students should collect data that is meaningful to them. Sorting classroom objects or collecting data from their classmates will help students to view the data as meaningful and feel that there is a purpose to analyzing the data. Ask students to sort a collection of items in up to three categories. Then ask questions about the number of items in each category and the total number of items. Also ask students to compare the number of items in each category. The total number of items to be sorted should be less than or equal to 100 to allow for sums and differences less than or equal to 100 using the numbers 0 to 100.

Connections Across Standards

Using addition and subtraction within 20 to solve word problems involving all situations types. (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).

K.MD.3 (Prior Grade Standard) Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. The number of objects in each category should be less than or equal to ten. Counting and sorting coins should be limited to pennies.	**2.MD.10 (Future Grade Standard)** Organize, represent, and interpret data with up to four categories; complete picture graphs when single-unit scales are provided; complete bar graphs when single-unit scales are provided; solve simple put-together, take-apart, and compare problems in a graph.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- Rectangles, squares, trapezoids, and triangles are two-dimensional closed shapes having straight sides that meet at corners.
- 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.

Common Misconceptions

Students may think that a square that has been rotated is no longer the original shape. They need to have experiences with shapes in different orientations. For example, in the building-shapes strategy above, ask students to orient the smaller shapes in different ways.

Academic Vocabulary/Language

- attribute
- sides
- vertex
- two-dimensional shapes
- square
- triangle
- trapezoid
- rectangle
- circle

Tier 2

- describe

Learning Targets	I can make observations to understand that shapes have defining attributes, such as number of sides, number of corners (vertices), etc. I can explain why non-defining attributes, such as size, color or orientation can not be used to identify shapes. I can build and draw shapes that have given defining attributes by applying my understanding.

Assessment of Learning

- Students will understand that not all of the attributes a shape has are *defining* attributes. For example, a shape is a triangle because it is a closed shape with three straight sides. Whether the triangle is orange or small doesn't matter when defining the shape as a "triangle".
- Students will understand that changing a shape's size, color or orientation does not change the name of the shape. For example, a square is still a square even if you rotate the square onto a corner (vertice).
- Students will build or draw a shape with given attributes.

Sample Questions/Activities

1. Ask students to trace two different attribute or pattern blocks. Ask students to name each shape and then tell how the two shapes are alike and how they are different.
2. Display a triangle. Say to students, "I'm going to say a change I'm going to make to this shape and you tell me if the change will make the shape have a new name." Pose changes such as: color the triangle blue, make the triangle smaller, add one more side to the triangle, turn the triangle on a corner (vertice), make the triangle bigger, add another corner (vertice) to the triangle, etc. After each proposed change, discuss if the shape would still be a triangle and why or why not.
3. Give students straws or popsicle sticks. Ask students to build a shape with a given set of attributes (e.g., "Build a shape with 4 sides. Make all 4 sides the same length.").

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

When students are asked to describe a shape, they will list both defining and non-defining attributes. Discussions about what attributes determine the name of a shape, such as a square or triangle can help students to differentiate between the two types of attributes. Students can easily form shapes on geoboards using colored rubber bands to represent the sides of a shape. Ask students to create a shape with four sides on their geoboard and then copy the shape on dot paper. Students can share and describe their shapes as a class while the teacher records the different defining attributes mentioned by the students. Asking questions such as, "If we color this shape red, will it still be a square?" or "If we add another side, will it still be a triangle?" will help students to determine if an attribute is defining or non-defining.

Connections Across Standards

A half circle is related to half hour (1.MD.3).

K.G.2 (Prior Grade Standard)	**2.G.1 (Future Grade Standard)**
Correctly name shapes regardless of their orientations or overall size.	Recognize and identify triangles, quadrilaterals, pentagons, and hexagons based on the number of sides or vertices. Recognize and identify cubes, rectangular prisms, cones, and cylinders.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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."

Essential Understandings

- Shapes can be combined to form larger shapes:
  - two-dimensional shapes with two-dimensional shapes
  - three-dimensional shapes with three-dimensional shapes

Common Misconceptions

Students may struggle to see a new shape from a composite shape. For example, a triangle and a square create a composite shape - pentagon. Students may see only the triangle and square not the pentagon. Students struggle to identify attributes of a shape that determines the shape name. Although students do not need to know the formal names for the 3-D shapes, they should understand that a new composite shape may have a new name.

Academic Vocabulary/Language

- composite
- two-dimensional
- square
- triangle
- trapezoid
- rectangle
- half-circle
- quarter-circle
- three-dimensional

Tier 2

- put together

Learning Targets	I can combine two-dimensional shapes to make rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles to make a composite shape. I can combine three-dimensional shapes to make cubes, right rectangular prisms, right circular cones, and right circular cylinders to make a composite shape.

Assessment of Learning

- Students will create a composite shape by combining two-dimensional shapes.
- Students will use the two-dimensional composite shapes to compose new shapes.
- Students will create a composite shape by combining three-dimensional shapes.
- Students will use the three-dimensional composite shapes to compose new shapes.
- Students will use informal language to name and/or describe the new shapes.

Sample Questions/Activities

1. Give students a pile of pattern blocks or tangram pieces and have students use the shapes to create composite shapes. Have students describe and name (if possible) the new shapes that were created. Repeat with three-dimensional solids.
2. Give students geoboards, rubber bands and dot paper. Ask students to create a square using the perimeter of the geoboard. Ask students, "How many different shapes can you make by adding rubber bands to the geoboard to cut apart the square?" Have students record their findings on dot paper. Have students describe and name the shapes they find.
3. Give students multiple sets of tangram pieces. Challenge students to make as many variations of a given shape as possible. For example, ask students to use the pieces to make as many different rectangles as possible. Share students' solutions and ask students to explain how they know each new shape is a rectangle.
4. Use solid objects within the classroom to create composite shapes. Give student groups objects such as tissue boxes, globes, playground balls, dice, etc. and ask them to compose new shapes. Ask students to describe the new shapes they created.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students benefit from time to explore how shapes can be put together to form new shapes. Students should also explore how a larger shape can be divided up into smaller shapes. Students can use a variety of manipulatives and real-world objects to build larger shapes. The manipulatives can include paper shapes, pattern blocks, color tiles, triangles cut from squares (isosceles right triangles), tangrams, canned food (right circular cylinders) and gift boxes (cubes or right rectangular prisms). Geoboards and dot paper can be used to record students' findings. Students can use informal language to describe the new shapes they created, rather than terms like "rectangular prism".

Connections Across Standards

A half circle is related to half hour (1.MD.3).

K.G.6 (Prior Grade Standard)	**2.G.1 (Future Grade Standard)**
Combine simple shapes to form larger shapes.	Recognize and identify triangles, quadrilaterals, pentagons, and hexagons based on the number of sides or vertices. Recognize and identify cubes, rectangular prisms, cones, and cylinders.

Ohio's Learning Standards-Clear Learning Targets

Math Grade 1

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.

Essential Understandings

- 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.

Common Misconceptions

Some students may think that the size of the equal shares is directly related to the number of equal shares. For example, they think that fourths are larger than halves because there are four fourths in one whole and only two halves in one whole. Students need to focus on the change in the size of the fractional parts as recommended in the folding shapes strategy. Allow students to divide a circle into the number of equal parts that they choose. Students can easily see the change in the size of the equal shares as they increase or decrease the number of parts.

Academic Vocabulary/Language

- whole
- equal part (s)
- halves
- fourth
- quarter
- half of
- fourth of
- quarter of
- share

Tier 2

- divide
- describe

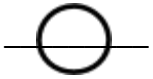
Learning Targets	I can partition circles and rectangles into two and four equal parts I can describe the equal parts using the words halves, fourths, quarters, half of, fourth of and quarter of. I can describe the whole as two of or four of the shares in real-world contexts. I can explain how dividing a circle or rectangle into more equal parts means there will be smaller parts.

Assessment of Learning

- Students will partition circles and rectangles into two and four equal parts.
- Students will understand that when partitioning shapes into parts, all of the parts must be equal, or represent the same amount.
- Students will use words like halves, fourths, half of, fourth of, and quarter of to describe the equal parts.
- Students will understand that as the number of equal parts increases, the size of the equal parts decreases and vice versa.

Sample Questions/Activities

1. You and 3 friends want to share a pizza. How could you cut (partition) the pizza so that you and your friends get an equal share? What would you name the equal parts? Explain.
2. You can have only one slice of pizza. You ordered two pizzas: one sliced into two equal pieces and one sliced into four equal pieces. Which pizza should you pick your slice from if you want the largest piece? Explain.
3. Ashley drew a rectangle and partitioned the rectangle. She named each equal piece "a quarter of the rectangle". What could Ashley's rectangle look like? How do you know?
4. Caitlin's mom told her to share her cookie with her brother. Caitlin cut (partitioned) the cookie like the cookie below and said, "I cut the cookie into halves!" Is Caitlin right? Why or why not?



Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students typically have an innate understanding of sharing, and especially *fair* shares. This understanding can help students to grasp the concept of fractional parts as equal parts of a whole. Students should discover that folding or cutting an object into two pieces only makes the pieces "halves" if the two pieces are equal. Folding shapes made from paper enables students to physically feel the shape and form the equal shares. Ask students to fold circles and rectangles first into halves and then into fourths. They should observe and then discuss the change in the size of the parts.

Connections Across Standards

A half circle is related to half hour (1.MD.3).

K.G.4 (Prior Grade Standard)	**2.G.3 (Future Grade Standard)**
Describe and compare two- or three-dimensional shapes, in different sizes and orientations, using informal language to describe their commonalities, differences, parts, and other attributes.	Partition circles and rectangles into two, three, or four equal shares; describe the shares using the words halves, thirds, or fourths and quarters, and use the phrases half of, third of, or fourth of and quarter of. Describe the whole as two halves, three thirds, or four fourths in real-world contexts. Recognize that equal shares of identical wholes need not have the same shape.