3rd Grade Math

Pacing Guide and Unpacked Standards

GROVEPORT MADISON SCHOOLS

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Groveport Madison Math Pacing Guide - Grade 3

3rd	Operations & Algebraic Thinking	Number & Operations in Base Ten	Number & Operations in Fractions	Measurement & Data	Geometry	Standards for Mathematical Practice
1st 9wks	3.OA.1 - Interpret products of whole numbers, including commutative property 3.OA.3 - Use multiplication & division within 100 to solve word problems, draw the mathematics in the problem 3.OA.5 - Apply properties of operations to multiply & divide (commutative, associative, distributive) 3.OA.7 - Fluently multiply & divide within 100, division without remainders	3.NBT.1 - Use place value to rebound whole numbers to the nearest 10 or 100 3.NBT.2 - Fluently add & subtract within 1000				MP.1 - Make sense of problems and persevere in solving them MP.2 - Reason abstractly and quantitatively MP.3 - Construct viable arguments and critique the reasoning of others MP.4 - Model with mathematics MP.5 - Use appropriate tools strategically MP.6 - Attend to precision MP.7 - Look for and make use of structure MP.8 - Look for and express regularity in repeated reasoning
2nd 9wks	3.OA.2 - Interpret whole-number quotient of whole numbers 3.OA.3 - Use multiplication & division within 100 to solve word problems, draw the mathematics in the problem 3.OA.4 - Determine the unknown whole number in a multiplication or division equation relating three whole numbers 3.OA.6 - Understand division as an unknown-factor problem 3.OA.7 - Fluently multiply & divide within 100, division without remainders 3.OA.8 - solve two-step word problems 3.OA.9 - Identify arithmetic patterns	3.NBT.3 - Multiply one-digit whole numbers by multiples of 10		3.MD.3 - Create scaled picture & bar graphs; solve two-step problems 3.MD.5(a,b) - Recognize & understand concepts of area 3.MD.6 - Measure areas by counting squares 3.MD.7(a,b,c,d) - Relate area to the operations of multiplication & addition		

Groveport Madison Math Pacing Guide - Grade 3

3rd	Operations & Algebraic Thinking	Number & Operations in Base Ten	Number & Operations in Fractions	Measurement & Data	Geometry	Standards for Mathematical Practice
3rd 9wks			3.NF.1 - Understand a fraction 1/b 3.NF.2(a,b) - Understand a fraction as a number on the number line using denominators 2, 3, 4, 6, 8 3.NF.3(a,b,c,d) - Explain equivalence of fractions & compare fractions	3.MD.1 - Tell & write time 3.MD.2 - Measure & estimate liquid volumes & masses of objects 3.MD.4 - Generate measurement data & create a line plot		MP.1 - Make sense of problems and persevere in solving them MP.2 - Reason abstractly and quantitatively MP.3 - Construct viable arguments and critique the reasoning of others MP.4 - Model with mathematics MP.5 - Use appropriate tools strategically MP.6 - Attend to precision MP.7 - Look for and make use of structure MP.8 - Look for and express regularity in repeated reasoning
4th 9wks				3.MD.5(a,b) - Recognize & understand concepts of area 3.MD.6 - Measure areas by counting squares 3.MD.7(a,b,c,d) - Relate area to the operations of multiplication & addition 3.MD.8 - Solve real world & mathematical problems involving perimeters	3.G.1 - Understand shape attributes & draw examples 3.G.2 - Partition shapes into equal area & express the area of each part as a fraction	

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

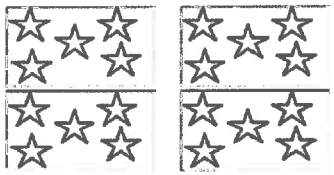
3.OA.1	Interpret products of whole numbers, e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. (Note: These standards are written with the convention that *a* x *b* means *a* groups of *b* objects each; however, because of the commutative property, students may also interpret 5 x 7 as the total number of objects in 7 groups of 5 objects each).	**Common Misconceptions** Students get confused when thinking about the number of groups and the number in each groups. Students add the two numbers without thinking about number of groups.	**Vocabulary** ▪ Equal groups ▪ Multiplication ▪ Multiplication sentence ▪ Factors ▪ Multiply ▪ Product ▪ Interpret ▪ Solve ▪ Identify
Essential Question(s) How can I find the total number of objects in equal groups?			
Essential Skills	I can find the product of multiple groups of objects. I can Interpret products of whole numbers as a total number of objects in a number of groups.		

Examples

4 groups of 5 stars is 20 stars.

Questions

Write two ways you could find the total number of stars shown.



Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

In Grade 2, students found the total number of objects using rectangular arrays, such as a 5 x 5, and wrote equations to represent the sum. This strategy is a foundation for multiplication because students should make a connection between repeated addition and multiplication.

Students need to experience problem-solving involving equal groups (whole unknown or size of group is unknown) and multiplicative comparison (unknown product, group size unknown or number of groups unknown) as shown in Table 2 of the Common Core State Standards for Mathematics, page 89. No attempt should be made to teach the abstract structure of these problems.

2.OA.4 (Prior Grade Standard)

Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

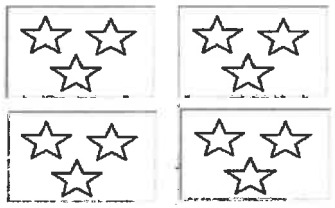
4.OA.2 (Future Grade Standard)

Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. See Ohio's Learning Standards, Table 2, pg. 96. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	**Common Misconceptions** Students also think that 3 ÷ 15 = 5 and 15 ÷ 3 = 5 are the same equations. The use of models is essential in helping students eliminate this misunderstanding.	**Vocabulary** ▪ Divide ▪ Division sentence ▪ Quotient ▪ Equal ▪ Describe ▪ Solve ▪ Determine
Essential Question(s) When you divide, what do you find?			
Essential Skills	I know what the numbers in a division problem represent. I can explain what division means and how it relates to equal shares Interpret quotients as the number of shares or the number of groups when a set of objects is divided equally.		

Example	Question
 When I put 12 objects into four equal groups I get 3 objects in each group.	Write a number expression that would explain how many pieces of candy 8 students would get if they share 56 pieces equally?

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Encourage students to solve these problems in different ways to show the same idea and be able to explain their thinking verbally and in written expression. Allowing students to present several different strategies provides the opportunity for them to compare strategies.

2.OA.1 (Prior Grade Standard)

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 Ohio's Learning Standards, Table 1, page 95.

4.OA.2 (Future Grade Standard)

Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. See Table 2, page 96. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. See Ohio's Learning Standards, Table 2, page 96. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)	**Common Misconceptions** Students also think that 3 ÷ 15 = 5 and 15 ÷ 3 = 5 are the same equations. The use of models is essential in helping students eliminate this misunderstanding.	**Vocabulary** ▪ Commutative Property of Multiplication ▪ Array ▪ Equation ▪ Variable ▪ Solve
Esssential Question(s) How do I know when to use multiplication or division to solve a problem			
Essential Skills	I can multiply and divide within 100. I can solve word problems in situations involving equal groups, arrays, and measurement quantities. I can represent a word problem using a picture, and an equation with a symbol for the unknown number		

Examples

3 x 4 = 12

Give student any multiplication or division problem up to 100 without a remainder and they can accurately solve. 10 x 10 = 100

Questions

If 48 plums are shared equally into 4 bags, then how many plums will be in each bag?

A rectangle has an area of 36 square centimeters. If one side is 9 cm long, how long is a side that is next to it?

Performance Level Descriptors

- **Limited:** Demonstrate some understanding of multiplication using equal-sized groups and/or arrays
- **Basic:** Demonstrate an understanding of multiplication of whole numbers using equal-sized groups and arrays
- **Proficient:** Demonstrate an understanding of multiplication and division of whole numbers including using equal sized groups, arrays, and area models
- **Accelerated:** Use equal-sized groups, arrays, area models, the properties of multiplication and division, and place value to solve a variety of problems
- **Advanced:** Use equations with unknowns, models and graphs to solve problems

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Sets of counters, number lines to skip count and relate to multiplication and arrays/area models will aid students in solving problems involving multiplication and division. Allow students to model problems using these tools. They should represent the model used as a drawing or equation to find the solution.

This shows multiplication using grouping with 3 groups of 5 objects and can be written as 3 × 5.

2.OA.4 (Prior Grade Standard)

Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

4.NBT.5 (Future Grade Standard)

Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.4

Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?.*

Essential Question(s)

In what ways can multiplication and division affect numbers?

How does multiplication and division offer efficient ways to get an answer?

Common Misconceptions

Students think a symbol (? or □) is always the place for the answer. This is especially true when the problem is written as 15 ÷ 3 =? or 15 = □ x 3. Students also think that 3 ÷ 15 = 5 and 15 ÷ 3 = 5 are the same equations. The use of models is essential in helping students eliminate this understanding.

The use of a symbol to represent a number once cannot be used to represent another number in a different problem/situation. Presenting students with multiple situations in which they select the symbol and explain what it represents will counter this misconception.

Vocabulary

- Factor
- Product
- Dividend
- Divisor
- Quotient
- Variable
- Equation
- Solve
- Determine
- Represent

Essential Skills

I can multiply and divide within 100

I can determine which operation (multiplication or division) is needed to determine the unknown whole number.

I can solve to find the unknown whole number in a multiplication or division equation.

Examples	Questions
$8 \times ? = 48$	Find the missing number to make the equation true. $? \times 12 = 36$
$5 = ? \div 3$	Find the missing number to make the equation true. $7 = ? \div 48$

Performance Level Descriptors

- **Limited:** Use multiplication fact family understanding or models to solve simple multiplication and division problems.
- **Basic:** Use multiplication fact family understanding to solve simple problems.
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** Use equations with unknowns, models and graphs to solve problems.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students can use known multiplication facts to determine the unknown fact in a multiplication or division problem. Have them write a multiplication or division equation and the related multiplication or division equation. For example, to determine the unknown whole number in 27 ÷ □ = 3, students should use knowledge of the related multiplication fact of 3 × 9 = 27. They should ask themselves questions such as, "How many 3s are in 27 ?" or "3 times what number is 27?" Have them justify their thinking with models or drawings.

2.OA.1 (Prior Grade Standard)	4.OA.2 (Future Grade Standard)
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 Ohio's Learning Standards, Table 1, page 95.	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. See Ohio's Learning Standards, Table 2, page 96. Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

3.OA.5	Apply properties of operations as strategies to multiply and divide. *For example, if 6 × 4 = 24 is known, then 4 × 6 = 24 is also known (Commutative Property of Multiplication); 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30 (Associative Property of Multiplication); knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56 (Distributive Property).* Students need not use formal terms for these properties.	**Common Misconceptions** Students may not know that 5 x 20 is the same amount as 20 x 5. Students may have difficulty seeing that each arrangement can be rotated to show the commutative property.	**Vocabulary** ▪ Commutative property ▪ Associative property ▪ Distributive property ▪ Apply ▪ Explain ▪ Relate
Essential Question(s) Can you solve problems involving all of the properties of multiplication and division?			
Essential Skills	I multiply and divide within 100. I can explain how the properties of operations work. I can apply properties of operations as strategies to multiply and divides.		

Examples	Questions
6 x 4 = 24 so 4 x 6 = 24 3 x 5 x 2 can be found by (3 x 5) x 2 = 30 OR 3 x (5 x 2) = 30 Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) 2) = (8 × 5) + (8 × 2) = 40 + 16	Explain how the answer to 27 + 48 can be found easily if someone has already told you that 48 + 27 = 75? Mary says that she can multiply 17 x 5 x 2 more easily if she multiplies the 56 x 2 first. Explain why this should still give the correct answer. Kelsey says that to multiply 17 x 5, she first multiplies 10 x 5. What must she do next to get the correct answer to 17 x 5?

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** Use the properties of multiplication and division to solve problems.
- **Accelerated:** Apply understanding of place value, properties, and relationships among operations to solve multiplication and division problems.
- **Advanced:** Apply efficient understanding of place value, properties, and relationships among operations to solve multiplication and division problems.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students need to apply properties of operations (commutative, associative and distributive) as strategies to multiply and divide. Applying the concept involved is more important than students knowing the name of the property. Understanding the commutative property of multiplication is developed through the use of models as basic multiplication facts are learned. For example, the result of multiplying 3 x 5 (15) is the same as the result of multiplying 5 x 3 (15).

To find the product of three numbers, students can use what they know about the product of two of the factors and multiply this by the third factor. For example, to multiply 5 x 7 x 2, students know that 5 x 2 is 10. Then, they can use mental math to find the product of 10 x 7 (70). Allow students to use their own strategies and share with the class when applying the associative property of multiplication.

Splitting arrays can help students understand the distributive property. They can use a known fact to learn other facts that may cause difficulty. For example, students can split a 6 x 9 array into 6 groups of 5 and 6 groups of 4; then, add the sums of the groups.

2.NBT.5 (Prior Grade Standard)	4.OA.3 (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.	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

3.OA.6	Understand division as an unknown factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	**Common Misconceptions** Students do not understand part - whole relationships. Students do not understand the inverse relationship between multiplication and division.	**Vocabulary** ▪ Dividend ▪ Divisor ▪ Quotient ▪ Factor ▪ Relationship ▪ Inverse ▪ Explain
Essential Question(s) In what ways can division affect numbers?			
Essential Skills	I can identify the multiplication problem as related to the division problem. I can identify the unknown factor in the related multiplication problem. I can recognize multiplication and division as related operations and explain how they are related. I can use multiplication to solve division problems.		

Example	Question
To find 32 ÷ 8 use 8 x = 32	John says he solves the problem of 56 ÷ 8 by solving the related multiplication fact. What is the related multiplication fact?

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students' understanding of the part/whole relationships is critical in understanding the connection between multiplication and division.

2.NBT.5 (Prior Grade Standard)	4.NBT.6 (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.	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division, e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8 or properties of operations. Limit to division without remainders. By the end of Grade 3, know from memory all products of two one-digit numbers.	**Common Misconceptions** The student may know the commutative property of multiplication but fails to apply it to simplify the "work" of multiplication. Ex: Student states that 9 × 4 = 36 with relative ease, but struggles to find the product of 4 × 9. The student sees multiplication and division as discrete and separate operations. Ex: Student has reasonable facility with multiplication facts but cannot master division facts. He may know that 6 × 7 = 42 but fails to realize that this fact also tells him that 42 ÷ 7 = 6. Student knows procedures for dividing but has no idea how to check the reasonableness of his answers.	**Vocabulary** ▪ Inverse operation ▪ Fact family ▪ Related facts ▪ Product ▪ Quotient ▪ Fluently ▪ Efficiently ▪ Divisor ▪ Factor ▪ Dividend

Essential Question(s)

Which strategy is most efficient when solving multiplication and division problems?

Why do we need math facts?

Essential Skills	I can know from memory all products of two one-digit numbers. I can fluently multiply and divide within 100. I can analyze a multiplication or division problem in order to choose an appropriate strategy to fluently multiply or divide within 100.

Examples	Questions
9 x 9 = 81	Recite the given multiplication facts in the allotted time.
72 ÷ 8 = 9	Recite the given division facts in the allotted time.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** Calculate the product of any two single-digit whole numbers; Use the relationship between multiplication and division to solve problems.
- **Accelerated:** Apply understanding of place value, properties, relationships among operations to solve multiplication and division problems.
- **Advanced:** Apply efficient understanding of place value, properties, relationships among operations to solve multiplication and division problems.

2.NBT.5 (Prior 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.	**4.NBT.6 (Future Grade Standard)** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter or a symbol, which stands for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. This standard is limited to problems posed with whole numbers and having whole-number answers. Students may use parentheses for clarification since algebraic order of operations is not expected.	**Common Misconceptions** The use of a symbol to represent a number once cannot be used to represent another number in a different problem/situation. Presenting students with multiple situations in which they select the symbol and explain what it represents will counter this misconception.	**Vocabulary** ▪ Variable ▪ Evaluate ▪ Equations ▪ Estimate ▪ Rounding ▪ Pattern ▪ Solve ▪ Represent ▪ Identify ▪ Explain
Essential Question(s) Why is it important to develop an equation to determine an unknown quantity in a two-step word problem? What strategies can be used to solve two–step word problem using the four operations?			
Essential Skills	I know strategies for estimating and mental computation. I can construct an equation with a letter standing for the unknown quantity. I can solve two-step word problems using the four operations. I can justify answers to problems using various estimation strategies.		

Examples	Questions
78-39=39 This makes sense because 78 rounds to 80 and 39 rounds to 40. 80-40 is 40. 39 is about 40.	Eliza had $24 to spend on seven notebooks. After buying them she had $10. How much did each notebook cost? Henry bought 6 hotdogs and 2 hamburgers. He spent $5.00. The hotdogs cost $.50 each. How much did one hamburger cost?

Performance Level Descriptors

- **Limited:** Solve familiar one-step problems involving one of the four operations +, -, x, ÷ and basic fact calculation.
- **Basic:** Solve routine one-step problems involving any of the four operations +, -, x, ÷.
- **Proficient:** Multiply and divide within 100 to solve one-step problems; Use equations, models, tables or graphs to solve routine problems; Represent and solve routine one- and two-step problems that may involve up to two different operations: +, - , x, ÷.
- **Accelerated:** Use mental computation and estimation strategies to review thinking and results; Represent and solve one- and two-step problems that may involve up to two different operations: +, - , x, ÷.
- **Advanced:** Use mental computation and estimation strategies to analyze thinking and results; Represent and solve non-routine multi-step problems involving more than one of the four operations +, - x, ÷.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Encourage students to represent the problem situation in a drawing or with counters or blocks. Students should determine the reasonableness of the solution to all problems using mental computations and estimation strategies.

Students gain a full understanding of which operation to use in any given situation through contextual problems. Number skills and concepts are developed as students solve problems. Problems should be presented on a regular basis as students work with numbers and computations.

Researchers and mathematics educators advise against providing "key words" for students to look for in problem situations because they can be misleading. Students should use various strategies to solve problems. Students should analyze the structure of the problem to make sense of it. They should think through the problem and the meaning of the answer before attempting to solve it.

2.NBT.5 (Prior Grade Standard)	4.OA.3 (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.	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	**Common Misconceptions** The student can state and give examples of properties of addition and multiplication but does not apply them to simplify computations.	**Vocabulary** ▪ Pattern ▪ Commutative Property ▪ Associative Property ▪ Distributive Property ▪ Identify ▪ Explain
Essential Question(s) Where can you see patterns in our world (music, art, architecture, nature, words, numbers)? How do patterns help us understand our world (music, art, architecture, nature, words, numbers)?			
Essential Skills	I can Identify arithmetic patterns. I can explain rules for a pattern using properties of operations. I can explain relationships between the numbers in a pattern.		

Examples	Questions
Find the various patterns in an addition table. 81-9 = 72, 72-9 = 63, 63-9 = 54, 54-9 = 45. The difference is 9 because you are subtracting 9. 8x2 = 16, 8x3 = 24, 8x4 = 32. The product is increasing by eight each time because the factor being multiplied by 8 is increasing by 1 each time. 5÷5 = 1, 50÷5 = 10, 500÷5 = 100, 5,000÷5 =1,000. The dividend and quotient are each increasing by a factor of 10.	Explain why whenever you add a number to itself the answer is always even. You are given two numbers whose difference is 8. If the one number is increased by 5 what needs to happen to the other number to have the difference remain8? Explain why multiples of 6 are always even and divisible by three. Describe the pattern of answers whenever a number is divided by 10.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students are to identify arithmetic patterns and explain them using properties of operations. They can explore patterns by determining likenesses, differences and changes. Use patterns in addition and multiplication tables.

2.OA.2 (Prior Grade Standard)	4.OA.5 (Future Grade Standard)
Fluently 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.	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.NBT.1

Use place value understanding to round whole numbers to the nearest 10 or 100.

Essential Question(s)

How does a digit's position affect its value?

Common Misconceptions

The use of terms like "round up" and "round down" confuses many students. For example, the number 37 would round to 40 or they say it "rounds up". The digit in the tens place is changed from 3 to 4 (rounds up). This misconception is what causes the problem when applied to rounding down. The number 32 should be rounded (down) to 30, but using the logic mentioned for rounding up, some students may look at the digit in the tens place and take it to the previous number, resulting in the incorrect value of 20. To remedy this misconception, students need to use a number line to visualize the placement of the number and/or ask questions such as: "What tens are 32 between and which one is it closer to?" Developing the understanding of what the answer choices are before rounding can alleviate much of the misconception and confusion related to rounding.

Vocabulary

- Round
- Arithmetic
- Solve

Essential Skills

I can define round or rounding in relation to place value.

I can round whole numbers to the nearest 10.

I can round whole numbers to the nearest 100.

Examples	Questions
21 rounded to the nearest 10 is 20. 68 rounded to the nearest 10 is 70.	What multiple of 10 is immediately above and below the number 66? Which number is closer?
423 rounded to the nearest 100 is 400. 598 rounded to the nearest 100 is 600.	What multiple of 100 is immediately above and below 478? Which is closer?

Performance Level Descriptors

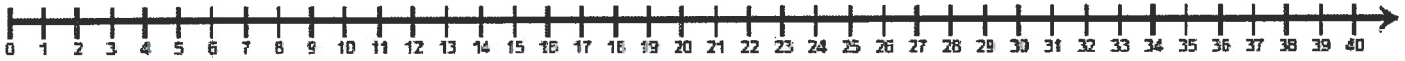
- **Limited:** N/A
- **Basic:** Round simple whole numbers to the nearest 10 or 100.
- **Proficient:** Round whole numbers to the nearest 10 or 100.
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Prior to implementing rules for rounding students need to have opportunities to investigate place value. A strong understanding of place value is essential for the developed number sense and the subsequent work that involves rounding numbers.

Building on previous understandings of the place value of digits in multi-digit numbers, place value is used to round whole numbers. Dependence on learning rules can be eliminated with strategies such as the use of a number line to determine which multiple of 10 or of100, a number is nearest (5 or more rounds up, less than 5 rounds down). As students' understanding of place value increases, the strategies for rounding are valuable for estimating, justifying and predicting the reasonableness of solutions in problem-solving.

Continue to use manipulatives, like hundreds charts and place-value charts. Have students use a number line or a roller coaster example to block off the numbers in different colors.
For example, this chart shows what numbers will round to the tens place.



2.NBT.3 (Prior Grade Standard)	4.NBT.3 (Future Grade Standard)
Read and write numbers to 1000 using base-ten numerals, number names, expanded form, and equivalent representations, e.g., 716 is 700 + 10 + 6, or 6 + 700 + 10, or 6 ones and 71 tens, etc.	Use place value understanding to round multi- digit whole numbers to any place through 1,000,000.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.NBT.2

Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Essential Question(s)

How can understanding place value help you add or subtract in an efficient manner?

Common Misconceptions

Students may not have a conceptual understanding of place value so that they would think 234 is 2+3+4 rather than 200+30+4 and may not see the relevance of the zeros.

Students may not have a conceptual understanding of place value so they would think 561 – 147 = 426, because they subtract the 7 in 147 from the 1 in 561 instead of regrouping.

Vocabulary

- Parentheses
- Associative property of addition.
- Commutative property of addition
- Identity property of addition
- Digit
- Solve

Essential Skills

I know strategies and algorithms for adding and subtracting within 1000

I can fluently add and subtract within 1000.

Examples	Questions
482 + 364 = 846 8,967 - 7,896 = 1071	Add a number to 361 that will increase the hundreds digit by 3, the tens digit by 2, and not change the ones digit. Vinnie accidently added 235 to a number and got 537 when she was suppose to subtract 235. What should the answer be?

Performance Level Descriptors

- **Limited:** Use strategies to solve straight forward one-step problems involving simple addition and subtraction within 1000.
- **Basic:** Add and subtract using strategies to solve routine one-step problems.
- **Proficient:** Add and subtract using strategies and/or algorithms to solve multi-step problems.
- **Accelerated:** Add and subtract using strategies and algorithms to solve multi-step problems.
- **Advanced:** Add and subtract using efficient strategies and/or algorithms to solve multi-step problems.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Strategies used to add and subtract two-digit numbers are now applied to fluently add and subtract whole numbers within 1000. These strategies should be discussed so that students can make comparisons and move toward efficient methods.

2.NBT.5 (Prior Grade Standard)	4.NBT.4 (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.	Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers less than or equal to 1,000,000. Fluently add and subtract multi-digit whole numbers using a standard algorithm.

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

3.NBT.3

Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Essential Question(s)

How can understanding place value help you multiply in an efficient manner?

Common Misconceptions

A problem like 5 x 40 is critical because of the discussion that would follow this problem. Reasoning for this problem would be that it represents 5 groups of 4 tens. When multiplying 5 groups of 4, you get the answer of 20. This may lead to confusion for some students because the product of the single digit number already ends in zero.

Be sure to go back to the place value language. 5 groups of 4 is 20 therefore, 5 groups of 4 tens would be 20 tens. 20 tens is the same as 200.

Avoid teaching tricks such as "adding zeros." For true understanding students need to understand and be able to explain the place value reasoning. Stating that you are "adding zeros" teaches many misconceptions.

Vocabulary

- Multiple
- Explain

Essential Skills

I know strategies to multiply one-digit whole numbers by multiples of 10 (up to 90).

I can apply knowledge of place value to multiply one-digit whole numbers by multiples of 10 in the range 10-90.

Examples	Question
8 x 80 = 640 7 x 90 = 630	Explain in words how a person could mentally multiply 70 by 4.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Understanding what each number in a multiplication expression represents is important. Multiplication problems need to be modeled with pictures, diagrams or concrete materials to help students understand what the factors and products represent. The effect of multiplying numbers needs to be examined and understood.

The use of area models is important in understanding the properties of operations of multiplication and the relationship of the factors and its product. Composing and decomposing area models is useful in the development and understanding of the distributive property in multiplication.

2.NBT.8 (Prior Grade Standard)	4.NBT.5 (Future Grade Standard)
Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Ohio's Learning Standards-Clear Learning Targets
Math, Grade 3

3.NF.1

Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.

Essential Question(s)

How does a fraction differ from a whole number?

Common Misconceptions

The idea that the smaller the denominator, the smaller the piece or part of the set, or the larger the denominator, the larger the piece or part of the set, is based on the comparison that in whole numbers, the smaller a number, the less it is, or the larger a number, the more it is. The use of different models, such as fraction bars and number lines, allows students to compare unit fractions to reason about their sizes.

Vocabulary

- Numerator
- Denominator
- Equivalent Fraction
- Fraction
- Unit Fraction
- Whole
- Explain
- Represent

Essential Skills

I can identify a fraction such as 2/3 and explain that the quantity formed is 2 equal parts of the whole partitioned into 3 equal parts (1/3 and 1/3 of the whole 3/3).

I recognize a unit fraction such as 1/4 as the quantity formed when the whole is partitioned into 4 equal parts.

I can express a fraction as the number of unit fractions.

I can use accumulated unit fractions to represent numbers equal to, less than, and greater than one (1/3 and 1/3 is 2/3; 1/3, 1/3, 1/3, and 1/3 is 4/3).

Examples

I can explain that the fraction $\frac{1}{4}$ means the whole has been divided into four equal parts.

I can explain that the fraction of $\frac{3}{4}$ means the whole has been divided into four equal parts and we have three of those parts.

Questions

Explain what John means when he says that he has divided the shape into thirds.

What does the fraction $\frac{2}{3}$ mean?

A. 3 halves
B. 2 parts of thirds
C. 2 wholes cut into thirds

Performance Level Descriptors

- **Limited:** Demonstrate minimal understanding of fractions by naming common unit fractions (denominators of 2, 3, 4, 6, 8) from visual models.
- **Basic:** Demonstrate a general understanding of fractions (denominators of 2, 3, 4, 6, 8) from visual models.
- **Proficient:** Develop an understanding of fractions as numbers.
- **Accelerated:** Apply an understanding of fractions to solve routine problems.
- **Advanced:** Apply an understanding of fractions to solve unfamiliar problems.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

This is the initial experience students will have with fractions and is best done over time. Students need many opportunities to discuss fractional parts using concrete models to develop familiarity and understanding of fractions.

Career Connection

Select a text for a shared reading that features how fractions are used in many parts of life (e.g., *If You Were a Fraction* by Trisha Speed Shaskan). Lead a discussion that emphasizes the importance of fractions in everyday experiences and the workplace. Allow students to share their ideas reflected in the text and identify examples of how fractions are used.

2.G.2-3 (Prior Grade Standard)

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.

4.NF.1 (Future Grade Standard)

Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Ohio's Learning Standards-Clear Learning Targets

Math, Grade 3

3.NF.2

Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

b. Represent a fraction *a/b* (which may be greater than 1) on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line.

Common Misconceptions

The idea that the smaller the denominator, the smaller the piece or part of the set, or the larger the denominator, the larger the piece or part of the set, is based on the comparison that in whole numbers, the smaller a number, the less it is, or the larger a number, the more it is. The use of different models, such as fraction bars and number lines, allows students to compare unit fractions to reason about their sizes.

Vocabulary

- Numerator
- Denominator
- Equivalent Fraction
- Fraction
- Unit Fractions
- Number line
- Interval
- Represent
- Recognize
- Explain
- Label
- Create

Essential Question(s)

How can a fraction be represented on a number line?

Essential Skills

I can define the interval from 0 to 1 on a number line as the whole.

I can divide a whole on a number line into equal parts.

I can recognize that the equal parts between 0 and 1 have a fractional representation.

I can explain that the end of each equal part is represented by a fraction (1/the number of equal parts).

I can represent each equal part on a number line with a fraction

Examples

Questions

Mark the number line shown into fourths and label the mark that represents $\frac{3}{4}$.

Performance Level Descriptors

- **Limited:** Complete visual fraction models to represent parts of a whole (denominators of 2, 3, 4, 6, 8).
- **Basic:** Place unit fractions (denominators of 2, 3, 4, 6, 8) on a number line.
- **Proficient:** Use fractions along with visual fraction models to represent parts of a whole; Understand that the size of a fractional part is relative to the size of the whole.
- **Accelerated:** Use the understanding that the size of a fractional part is relative to the size of the whole to solve problems.
- **Advanced:** Explain how the size of a fractional part is relative to the size of the whole.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Understanding that a fraction is a quantity formed by part of a whole is essential to number sense with fractions. Fractional parts are the building blocks for all fraction concepts. Students need to relate dividing a shape into equal parts and representing this relationship on a number line, where the equal parts are between two whole numbers. Help students plot fractions on a number line, by using the meaning of the fraction. For example, to plot 4/5 on a number line, there are 5 equal parts with 4 copies of the 5 equal parts.

2.G.2-3 (Prior Grade Standard)

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.

4.NF.6 (Future Grade Standard)

Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

Ohio's Learning Standards-Clear Learning Targets

Math, Grade 3

3.NF.3

Explain equivalence of fractions in special cases, reasoning about their size and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Essential Question(s)

How can two fractions have the same value?

Common Misconceptions

The idea that the smaller the denominator, the smaller the piece or part of the set, or the larger the denominator, the larger the piece or part of the set, is based on the comparison that in whole numbers, the smaller a number, the less it is, or the larger a number, the more it is. The use of different models, such as fraction bars and number lines, allows students to compare unit fractions to reason about their sizes.

Vocabulary

- Numerator
- Denominator
- Equivalent Fraction
- Fraction
- Unit Fractions
- Explain
- Reasoning
- Recognize
- Generate
- Express
- Compare
- Record
- Identify
- Create

Essential Skills

I can describe equivalent fractions.

I can recognize simple equivalent fractions.

I can compare fractions by reasoning about their size to determine equivalence.

I can use number lines, size, visual fraction models, etc. to find equivalent fractions.

I can recognize whole numbers written in fractional parts on a number line.

I can recognize the difference between a whole number and a fraction.

I can explain how a fraction is equivalent to a whole number.

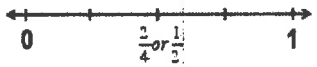
I can compare two fractions with the same numerator by reasoning about their size.

I can compare two fractions with the same denominator by reasoning about their size.

Examples

$\frac{10}{2} = 2$

$\frac{1}{4} < \frac{1}{2}$



The fractions $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent because they are at the same place on a number line.

$\frac{5}{10}$ and $\frac{3}{6}$ are equivalent fractions because they are both equal to $\frac{1}{2}$.

Given $\frac{2}{3}$ I can find that $\frac{4}{6}$ is an equivalent fraction.

When I look at the pictures of the cookies, I can tell that $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$ are equivalent.

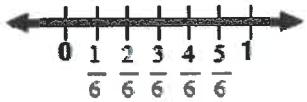
$3 = \frac{3}{1}$

$\frac{4}{5} > \frac{2}{5}$

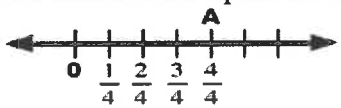
Questions

On the number line shown, label the places where 1/3 and 2/3 should appear?

where $\frac{1}{3}$ and $\frac{2}{3}$ should appear.



What whole number could replace the faction at A?



Which of the following are equivalent?

$\frac{2}{4}, \frac{2}{6}, \frac{1}{2}$

Write two fractions equivalent to $\frac{3}{5}$.

What two fractions does this figure show to be equivalent?

Which of the following is equivalent to 5?

A. $\frac{1}{5}$

B. $\frac{5}{1}$

C. $\frac{1}{5}$

What symbol, <, =, or >, should be place in the ☐ to make the sentence true?

$\frac{1}{3}$ ☐ $\frac{1}{6}$

Performance Level Descriptors

- **Limited:** Compare the visual fraction models of two common fractions (denominators with pairs of 2 and 4, 3 and 6, 4 and 8).
- **Basic:** Use fractions to represent numbers less than one and equal to one. Compare the visual fraction models of two common fractions (denominators with pairs of 2 and 4, 3 and 6, 4 and 8).
- **Proficient:** Use fractions to represent numbers equal to, less than, and greater than one. Solve problems that involve comparing fractions by using visual fraction models.
- **Accelerated:** Compare fractions using visual fraction models and <, >, =.
- **Advanced:** Compare fractions using <, >, =. Solve problems that involve comparing fractions using visual fraction models and strategies based on noticing equal numerators or denominators.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students need to know how big a particular fraction is and can easily recognize which of two fractions is larger. The fractions must refer to parts of the same whole. Benchmarks such as 1/2 and 1 are also useful in comparing fractions. Equivalent fractions can be recognized and generated using fraction models. Students should use different models and decide when to use a particular model. Make transparencies to show how equivalent fractions measure up on the number line. Venn diagrams are useful in helping students organize and compare fractions to determine the relative size of the fractions, such as more than 1/2 , exactly 1/2 or less than 1/2 . Fraction bars showing the same sized whole can also be used as models to compare fractions. Students are to write the results of the comparisons with the symbols >, =, or < and justify the conclusions with a model.

2.G.2-3 (Prior Grade Standard)

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.

4.NF.5 (Future Grade Standard)

Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* In general, students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators, but addition and subtraction with unlike denominators is not a requirement at this grade.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.MD.1

Work with time and money.

a. Tell and write time to the nearest minute. Measure time intervals in minutes (within 90 minutes). Solve real- world problems involving addition and subtraction of time intervals (elapsed time) in minutes, e.g., by representing the problem on a number line diagram or clock.

b. Solve word problems by adding and subtracting within 1,000, dollars with dollars and cents with cents (not using dollars and cents simultaneously) using the $ and ¢ symbol appropriately (not including decimal notation).

Common Misconceptions

Vocabulary

- Analog clock
- Digital clock
- Time interval
- Number line diagram
- Solve
- Representing

Essential Question(s)

Why is telling time to the minute important?

Why is it important to be able to add and subtract money?

Essential Skills

I can solve real world problems involving addition and subtraction of time intervals in minutes.

I can compare an analog clock face with a number line diagram.

I can tell and write time to the nearest minute.

I can solve word problems involving money.

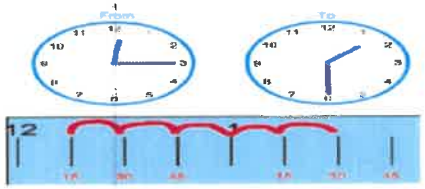
I can use the $ and cents symbol appropriately.

Examples

The time is 11:43

Soccer practice started at 4:12 and ended at 4:56.
Soccer practice lasted 44 minutes.

Lunch started at 12:05 and ended 30 minutes later.
Lunch ended at 12:35.



Questions

Time how long it takes for your heart to beat 100 times.

Sally left for school at 7:45am. Mary left at 8:05am.
How many minutes later did Mary leave than Sally?

Use the number line to find the difference between 12:45 p.m. and 2:15 p.m.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** N/A
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

A clock is a common instrument for measuring time. Learning to tell time has much to do with learning to read a dial-type instrument and little with time measurement. Students have experience in telling and writing time from analog and digital clocks to the hour and half hour in Grade 1 and to the nearest five minutes, using a.m. and p.m. in Grade 2. Now students will tell and write time to the nearest minute and measure time intervals in minutes. Provide analog clocks that allow students to move the minute hand. Students need experience representing time from a digital clock to an analog clock and vice versa. Provide word problems involving addition and subtraction of time intervals in minutes. Have students represent the problem on a number line. Student should relate using the number line with subtraction from Grade 2.

2.MD.7 (Prior Grade Standard)

Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

4.MD.2 (Future Grade Standard)

Solve real-world problems involving money, time, and metric measurement. **a.** Using models, add and subtract money and express the answer in decimal notation. **b.** Using number line diagrams, clocks, or other models, add and subtract intervals of time in hours and minutes. **c.** Add, subtract, and multiply whole numbers to solve metric measurement problems involving distances, liquid volumes, and masses of objects.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. Add, subtract, multiply, or divide whole numbers to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. Excludes multiplicative comparison problems involving notions of "times as much"; See Ohio's Learning Standards, Table 2, page 96.	**Common Misconceptions** Students may read the mark on a scale that is below a designated number on the scale as if it was the next number. For example, a mark that is one mark below 80 grams may be read as 81 grams. Students realize it is one away from 80, but do not think of it as 79 grams.	**Vocabulary** ▪ Capacity ▪ Liquid volume ▪ Liter (L) ▪ Metric unit ▪ Milliliter (mL) ▪ Unit ▪ Estimate ▪ Solve ▪ Represent
Essential Question(s)			
Essential Skills	I can solve one-step word problems involving masses given in the same units. I can solve one-step word problems involving liquid volume given in the same units. I can explain how to measure liquid volumes in liters(l) and masses of objects using standard units of grams (g), kilograms (kg). I can measure liquid volumes using standard units of liters. I can measure mass of objects using standard units of grams (g) and kilograms (kg).		

Examples	Questions
I measured the water and found there was 2.5 liters. The apple weighs about 100 grams.	Use the balance scale to find the weight of the pencil. What is the approximate weight of a pencil? A. 10 grams B. 10 kilograms C. 10 liters How much does the box marked "X" weigh?  How many milliliters are there when you combine the two containers? 

Performance Level Descriptors

- **Limited:** Solve simple linear measurement problems. Given models, solve straight forward problems involving liquid volume or mass.
- **Basic:** Given models, solve simple problems involving liquid volume or mass.
- **Proficient:** Solve one-step problems involving measurement units of time, liquid volume, and mass.
- **Accelerated:** Solve one- and two-step problems involving measurement units of time, liquid volume, and mass.
- **Advanced:** Solve multi-step problems involving measurement units of time, liquid volume, and mass.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Provide opportunities for students to use appropriate tools to measure and estimate liquid volumes in liters only and masses of objects in grams and kilograms. Students need practice in reading the scales on measuring tools since the markings may not always be in intervals of one. The scales may be marked in intervals of two, five or ten. Allow students to hold gram and kilogram weights in their hand to use as a benchmark. Use water colored with food coloring so that the water can be seen in a beaker. Students should estimate volumes and masses before actually finding the measurement. Show students a group containing the same kind of objects. Then, show them one of the objects and tell them its weight. Fill a container with more objects and ask students to estimate the weight of the objects. Use similar strategies with liquid measures. Be sure that students have opportunities to pour liquids into different size containers to see how much liquid will be in certain whole liters. Show different containers and ask, "How many liters do you think will fill the container?"

2.MD.1(Prior Grade Standard)	4.MD.1 (Future Grade Standard)
Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tape.	Know relative sizes of the metric measurement units within one system of units. Metric units include kilometer, meter, centimeter, and millimeter; kilogram and gram; and liter and milliliter. Express a larger measurement unit in terms of a smaller unit. Record measurement conversions in a two-column table. *For example, express the length of a 4-meter rope in centimeters. Because 1 meter is 100 times as long as a 1 centimeter, a two-column table of meters and centimeters includes the number pairs 1 and 100, 2 and 200, 3 and 300,...*

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.MD.3	Create scaled picture graphs to represent a data set with several categories. Create scaled bar graphs to represent a data set with several categories. Solve two- step "how many more" and "how many less" problems using information presented in the scaled graphs. *For example, create a bar graph in which each square in the bar graph might represent 5 pets, then determine how many more/less in two given categories.*	**Common Misconceptions** Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.	**Vocabulary** ▪ Picture graph ▪ Scale ▪ Bar graph ▪ Key ▪ Picture graph ▪ Data ▪ Represent ▪ Solve ▪ Presented ▪ Analyze ▪ Interpret

Essential Question(s)

Why is accuracy important when drawing a graph or line plot?

Essential Skills

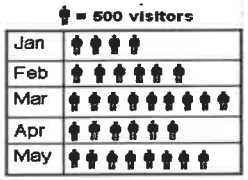
I can choose a proper scale for a bar graph or picture graph.

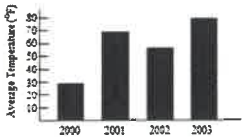
I can interpret a bar/picture graph to solve two-step problems asking "how many more" and "how many less."

I can create a scaled picture graph to show data.

I can create a scaled bar graph to show data.

Examples





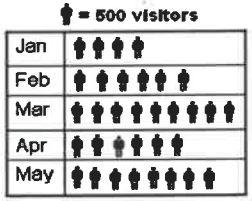
One Step- How many visitors were seen in April?
Two Step- How many more visitors were in May over January?

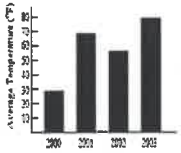
One Step- What was the average temperature in 2002?
Two Step- How much less was the temp. in 2002 than the highest year?

Questions

Draw a picture graph or bar graph to represent the data shown.
Easter Eggs Found on Hunt
Leah 3
Carrie 4
Kelsey 5

From the picture graph shown what is the difference between the number of visitors between February and May?





What year had the highest average temp?

Performance Level Descriptors

- **Limited:** Complete a picture graph or bar graph that uses a unit scale. Answer straightforward questions about information presented in a scaled picture graph or scaled bar graph.
- **Basic:** Complete a scaled picture graph or scaled bar graph. Answer simple questions about information presented in a scaled bar graph.
- **Proficient:** Represent data on scaled picture graphs and scaled bar graphs. Solve problems using information presented in a scaled bar graph.
- **Accelerated:** Represent data on scaled picture graphs and scaled bar graphs to solve problems. Solve non-routine problems using information presented in a scaled bar graph.
- **Advanced:** Create scaled picture graphs and scaled bar graphs to represent data and solve problems.

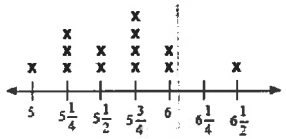
Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Representation of a data set is extended from picture graphs and bar graphs with single-unit scales to scaled picture graphs and scaled bar graphs. Intervals for the graphs should relate to multiplication and division with 100 (product is 100 or less and numbers used in division are 100 or less). In picture graphs, use values for the icons in which students are having difficulty with multiplication facts. For example, □ represents 7 people. If there are three □, students should use known facts to determine that the three icons represents 21 people. The intervals on the vertical scale in bar graphs should not exceed 100. Students are to draw picture graphs in which a symbol or picture represents more than one object. Bar graphs are drawn with intervals greater than one. Ask questions that require students to compare quantities and use mathematical concepts and skills. Use symbols on picture graphs that student can easily represent half of, or know how many half of the symbol represents.

2.MD.10 (Prior 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. See Ohio's Learning Standards, Table 1, page 95.	**4.MD.4 (Future Grade Standard)** Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems using numbers and operations for this grade.

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by creating a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	**Common Misconceptions** Although intervals on a bar graph are not in single units, students count each square as one. To avoid this error, have students include tick marks between each interval. Students should begin each scale with 0. They should think of skip-counting when determining the value of a bar since the scale is not in single units.	**Vocabulary** ▪ Line plot ▪ Halves ▪ Fourths ▪ Data ▪ Units ▪ Intervals ▪ Generate ▪ Show ▪ Plot
Essential Question (s) Why is accuracy important when drawing a graph or line plot?			
Essential Skills	I define horizontal axis. I can identify each plot on the line as data or a number of objects. I can analyze data from a line plot. I can determine appropriate unit of measurement. I can determine appropriate scale for line plot. I can generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. I can create a line plot where the horizontal scale is marked off in appropriate units - whole numbers, halves, or quarters.		

Example	Question
 The graph shows my data after measuring 13 pencils.	Measure the lengths of all the pencils belonging to the students in your classroom to the nearest quarter of an inch. Create a line graph to display this data.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** N/A
- **Proficient:** Create line plots for measurement data with scales of wholes, halves, and fourths of an inch.
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students are to measure lengths using rulers marked with halves and fourths of an inch and record the data on a line plot. The horizontal scale of the line plot is marked off in whole numbers, halves or fourths. Students can create rulers with appropriate markings and use the ruler to create the line plots.

2.MD.9 (Prior Grade Standard)	4.MD.4 (Future Grade Standard)
Generate measurement data by measuring lengths of several objects to the nearest whole unit or by making repeated measurements of the same object. Show the measurements by creating a line plot, where the horizontal scale is marked off in whole-number units.	Display and interpret data in graphs (picture graphs, bar graphs, and line plots) to solve problems using numbers and operations for this grade.

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

3.MD.5

Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

Common Misconceptions

Students may confuse perimeter and area when they measure the sides of a rectangle and then multiply. They think the attribute they find is length, which is perimeter. Pose problems situations that require students to explain whether they are to find the perimeter or area.

Vocabulary

- Area
- Square unit
- Unit Squared
- Figure
- Recognize

Essential Question (s)

What does the area of a 2 dimensional figure represent?

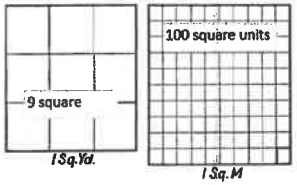
Essential Skills

I can define unit square.

I can define area.

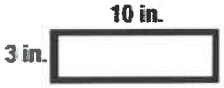
I can relate the number (n) of unit squares to the area of a plane figure.

Example



Question

What type of units would you use to completely cover the shape shown?



Performance Level Descriptors

- **Limited:** Count the unit squares to find the area of a gridded shape.
- **Basic:** Measure the area of a shape by counting unit squares.
- **Proficient:** Measure the area of a shape: by counting unit squares or by using the relationship of rectangular arrays and multiplication.
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Students can cover rectangular shapes with tiles and count the number of units (tiles) to begin developing the idea that area is a measure of covering. Area describes the size of an object that is two-dimensional. The formulas should not be introduced before students discover the meaning of area.

2.G.2 (Prior Grade Standard)

Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

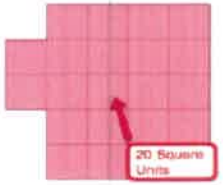
4.MD.3 (Future Grade Standard)

Develop efficient strategies to determine the area and perimeter of rectangles in real-world situations and mathematical problems. *For example, given the total area and one side length of a rectangle, solve for the unknown factor, and given two adjacent side lengths of a rectangle, find the perimeter.*

Ohio's New Learning Standards-Clear Learning Targets
Math, Grade 3

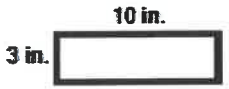
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).	**Common Misconceptions** Students may confuse perimeter and area when they measure the sides of a rectangle and then multiply. They think the attribute they find is length, which is perimeter. Pose problems situations that require students to explain whether they are to find the perimeter or area.	**Vocabulary** ▪ Area ▪ Square unit ▪ Unit Square
Essential Question (s) What does the area of a 2 dimensional figure represent?			
Essential Skills	I can use unit squares of cm, m, in, ft, and other sizes of unit squares to measure area. I can measure the area by counting unit squares.		

Example



Question

After drawing the unit squares that would completely cover the shape shown, determine the area.



Performance Level Descriptors

- **Limited:** Count the unit squares to find the area of a gridded shape.
- **Basic:** Measure the area of a shape by counting unit squares.
- **Proficient:** Measure the area of a shape: by counting unit squares or by using the relationship of rectangular arrays and multiplication.
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The area of a rectangle can be determined by having students lay out unit squares and count how many square units it takes to completely cover the rectangle completely without overlaps or gaps. Students need to develop the meaning for computing the area of a rectangle. A connection needs to be made between the number of squares it takes to cover the rectangle and the dimensions of the rectangle. Ask questions such as:

- What does the length of a rectangle describe about the squares covering it?
- What does the width of a rectangle describe about the squares covering it?

2.G.2 (Prior Grade Standard)

Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

4.MD.3 (Future Grade Standard)

Develop efficient strategies to determine the area and perimeter of rectangles in real-world situations and mathematical problems. *For example, given the total area and one side length of a rectangle, solve for the unknown factor, and given two adjacent side lengths of a rectangle, find the perimeter.*

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.MD.7

Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

b. Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real- world and mathematical problems, and represent whole- number products as rectangular areas in mathematical reasoning.

c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$ (represent the distributive property with visual models including an area model).

d. Recognize area as additive. Find the area of figures composed of rectangles by decomposing into non- overlapping rectangles and adding the areas of the non- overlapping parts, applying this technique to solve real- world problems.

Common Misconceptions

Students may confuse perimeter and area when they measure the sides of a rectangle and then multiply. They think the attribute they find is length, which is perimeter. Pose problems situations that require students to explain whether they are to find the perimeter or area.

Vocabulary

- Area
- Square unit
- Unit Square
- Formula
- Decompose
- Distributive Property
- Relate
- Represent
- Show
- Model
- Recognize

Essential Question(s)

What is an efficient strategy to determine the area of a 2 dimensional figure?

Essential Skills

I find the area of a rectangle by tiling it in unit squares.

I can find the side lengths of a rectangle in units.

I can compare the area found by tiling a rectangle to the area found by multiplying the side lengths.

I can multiply side lengths to find areas of rectangles.

I can solve real world and mathematical area problems by multiplying side lengths of rectangles.

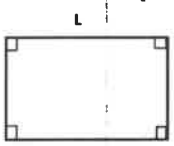
I can use rectangular arrays to represent whole-number products in multiplication problems.

I can multiply using an area model (array).

I can relate area of a rectangle to multiplication and addition by modeling the distributive property.

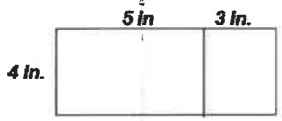
I can decompose rectilinear figures into non- overlapping rectangles.

Examples

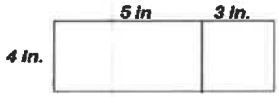


L = 4 in.
W = 3 in
Area = 4 x 3 =12 sq. in.

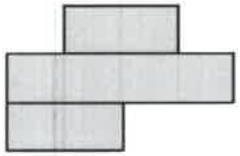
The student can describe a variety of rectangles that would have an area of 36 square feet.



The area is $4(5 + 3)$ or 32 $in.^2$



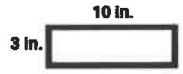
The area is $4(5) + 4(3)$ or 32 $in.^2$



The area of this irregular shape is
2 $in.^2$ + 4 $in.^2$ + 2 $in.^2$ or 8 $in.^2$ total.

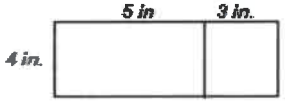
Questions

Find the area of the figure shown by first drawing the squares that completely fill the shape and then explain how this area can also be calculated by using the measurements of the sides.

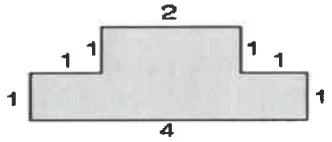


Show all of the rectangular arrays possible for the number 12.

Mrs. Jones gave each student two pieces of paper. One measured 4in by 5in and the other 4in by 3in. Students were told to tape them together as shown below. Find two different way to calculate the total area of the paper and explain why it works.



Find the area of the figure below.



Performance Level Descriptors

- **Limited:** Count the unit squares to find the area of a gridded shape.
- **Basic:** Measure the area of a shape by counting unit squares.
- **Proficient:** Measure the area of a shape: by counting unit squares or by using the relationship of rectangular arrays and multiplication.
- **Accelerated:** Compute the area of a shape composed of non-overlapping rectangles.
- **Advanced:** Compute the area of a complex shape in solving real-world problems.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The concept of multiplication can be related to the area of rectangles using arrays. Students need to discover that the length of one dimension of a rectangle tells how many squares are in each row of an array and the length of the other dimension of the rectangle tells how many squares are in each column. Ask questions about the dimensions if students do not make these discoveries. For example:

- How do the squares covering a rectangle compare to an array?
- How is multiplication used to count the number of objects in an array?

Students should also make the connection of the area of a rectangle to the area model used to represent multiplication. This connection justifies the formula for the area of a rectangle.

Provide students with the area of a rectangle (i.e., 42 square inches) and have them determine possible lengths and widths of the rectangle. Expect different lengths and widths such as, 6 inches by 7 inches or 3 inches by 14 inches.

2.G.2 (Prior Grade Standard)	**4.MD.3 (Future Grade Standard)**
Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	Develop efficient strategies to determine the area and perimeter of rectangles in real-world situations and mathematical problems. *For example, given the total area and one side length of a rectangle, solve for the unknown factor, and given two adjacent side lengths of a rectangle, find the perimeter.*

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.MD.8

Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Common Misconceptions

Students think that when they are presented with a drawing of a rectangle with only two of the side lengths shown or a problem situation with only two of the side lengths provided, these are the only dimensions they should add to find the perimeter.

Encourage students to include the appropriate dimensions on the other sides of the rectangle. With problem situations, encourage students to make a drawing to represent the situation in order to find the perimeter.

Vocabulary

- Area
- Square unit
- Unit Square
- Formula
- Perimeter

Essential Question (s)

What does the perimeter of a polygon (2 dimensional figure) represent?

What type of problem would require the use of area and perimeter as a solution?

Essential Skills

I can define polygon.

I can define perimeter.

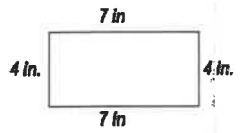
I can find the perimeter of a shape when given side lengths.

I can find the perimeter of a shape with an unknown side length.

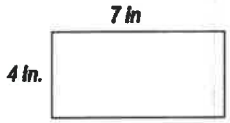
I can exhibit (design, create, draw, model, etc.) rectangles with the same perimeter and different areas.

I can exhibit rectangles with the same area and different perimeters

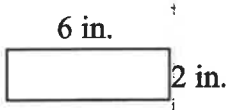
Examples



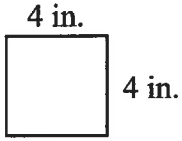
The perimeter is 7 in. + 7 in. + 4 in. + 4 in. = 22 in.



The perimeter is 2(7 in.) + 2(4 in.) = 22 in.

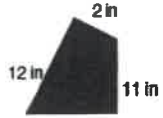


P =16 & A = 12

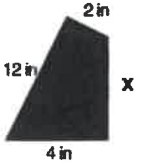


P = 16 & A = 16

Questions



Find the perimeter shown.



Find the perimeter shown.

Draw two different rectangles so both have a perimeter of 24 feet but their areas are different.

Performance Level Descriptors

- **Limited:** Find the perimeter of a simple shape given all the measurements in simple whole numbers.
- **Basic:** Understand how to find perimeter. Solve simple problems involving perimeters.
- **Proficient:** Understand perimeter and area and their differences. Solve problems involving perimeter.
- **Accelerated:** Solve complex problems involving perimeter and area.
- **Advanced:** Understand perimeter and area and explain their differences. Analyze rectangles with the same perimeter and different areas or rectangles with the same area and different perimeters. Write equations to solve problems involving perimeter and/or area.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

Geoboards can be used to find the perimeter of rectangles also. Provide students with different perimeters and have them create the rectangles on the geoboards. Have students share their rectangles with the class. Have discussions about how different rectangles can have the same perimeter with different side lengths.

Once students know how to find the perimeter of a rectangle, they can find the perimeter of rectangular-shaped objects in their environment. They can use appropriate measuring tools to find lengths of rectangular-shaped objects in the classroom. Present problems situations involving perimeter, such as finding the amount of fencing needed to enclose a rectangular shaped park, or how much ribbon is needed to decorate the edges of a picture frame. Also, present problem situations in which the perimeter and two or three of the side lengths are known, requiring students to find the unknown side length.

2.MD.3 (Prior Grade Standard)

Estimate lengths using units of inches, feet, centimeters, and meters.

4.MD.3 (Future Grade Standard)

Develop efficient strategies to determine the area and perimeter of rectangles in real-world situations and mathematical problems. *For example, given the total area and one side length of a rectangle, solve for the unknown factor, and given two adjacent side lengths of a rectangle, find the perimeter.*

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

3.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	**Common Misconceptions** Students may identify a square as a "non-rectangle" or a "non-rhombus" based on limited images they see. They do not recognize that a square is a rectangle because it has all of the properties of a rectangle. They may list properties of each shape separately, but not see the interrelationships between the shapes. For example, students do not look at the properties of a square that are characteristic of other figures as well. Using straws to make four congruent figures have students change the angles to see the relationships between a rhombus and a square. As students develop definitions for these shapes, relationships between the properties will be understood.	**Vocabulary** ▪ Attribute ▪ Hexagon ▪ Octagon ▪ Pentagon ▪ Polygon ▪ Quadrilateral ▪ Triangle ▪ Categorize ▪ Recognize ▪ Draw
Essential Question (s) Why do we sort and classify shapes?			
Essential Skills	I can identify and define rhombuses, rectangles, and squares as examples of quadrilaterals based on their attributes. I can describe, analyze, and compare properties of two-dimensional shapes. I can compare and classify shapes by attributes, sides, and angles I can group shapes with shared attributes to define a larger category (e.g., quadrilaterals). I can draw examples of quadrilaterals that do and do not belong to any of the subcategories.		

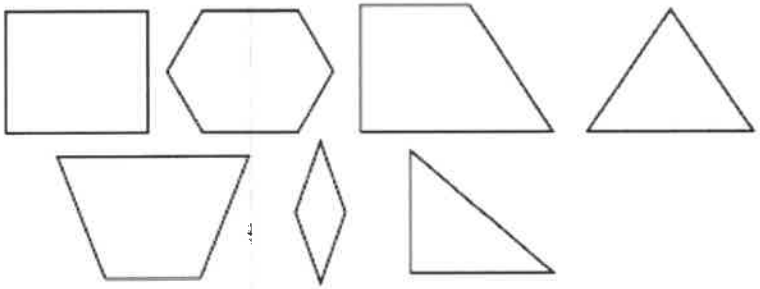
Example	Question
A rhombus and square are alike because they each have four congruent sides. They are different because a square has four 90 degree angles and a rhombus only needs opposite angles congruent.	What attribute(s) do these figures have in common? 

Performance Level Descriptors

- **Limited:** Recognize common quadrilaterals (square, rectangle, rhombus, and trapezoid) by the sides or the angles.
- **Basic:** Describe and compare sides and angles of common quadrilaterals.
- **Proficient:** Compare and classify shapes by their sides and angles.
- **Accelerated:** Describe, analyze, and compare properties of quadrilaterals.
- **Advanced:** Analyze the properties of two-dimensional shapes to explain classifications.

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

The focus now is on identifying and describing properties of two-dimensional shapes in more precise ways using properties that are shared rather than the appearances of individual shapes. These properties allow for generalizations of all shapes that fit a particular classification. Development in focusing on the identification and description of shapes' properties should include examples and non-examples, as well as examples and non-examples drawn by students of shapes in a particular category. For example, students could start with identifying shapes with right angles. An explanation as to why the remaining shapes do not fit this category should be discussed. Students should determine common characteristics of the remaining shapes.



2.G.1 (Prior Grade Standard)	4.G.2 (Future Grade Standard)
Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size.

Ohio's New Learning Standards-Clear Learning Targets

Math, Grade 3

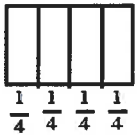
3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as ¼ of the area of the shape.*	**Common Misconceptions** Students may identify a square as a "non-rectangle" or a "non-rhombus" based on limited images they see. They do not recognize that a square is a rectangle because it has all of the properties of a rectangle. They may list properties of each shape separately, but not see the interrelationships between the shapes. For example, students do not look at the properties of a square that are characteristic of other figures as well. Using straws to make four congruent figures have students change the angles to see the relationships between a rhombus and a square. As students develop definitions for these shapes, relationships between the properties will be understood.	**Vocabulary** ▪ Partition ▪ Unit fraction ▪ Whole ▪ Area ▪ Express ▪ Describe

Essential Question (s)

Why do we sort and classify shapes?

Essential Skills	I know that shapes can be partitioned into equal areas. I can describe the area of each part as a fractional part of the whole. I can relate fractions to geometry by expressing the area of part of a shape as a unit fraction of the whole. I can partition a given shape it into equal parts, recognizing that these parts all have the same area and identify the fractional name of each part. I can partition a shape into parts with equal areas in several different ways.

Example



Question

Partition the shape shown into eight equal parts and label each part with the correct fraction that describes each part.

Performance Level Descriptors

- **Limited:** N/A
- **Basic:** Write the fraction name for a shaded part of a rectangular whole.
- **Proficient:** Relate fractions to geometry by naming the area of part of a shape as a fraction of the whole.
- **Accelerated:** N/A
- **Advanced:** N/A

Ohio Department of Education Model Curriculum Instructional Strategies and Resources

In Grade 2, students partitioned rectangles into two, three or four equal shares, recognizing that the equal shares need not have the same shape. They described the shares using words such as, halves, thirds, half of, a third of, etc., and described the whole as two halves, three thirds or four fourths. In Grade 4, students will partition shapes into parts with equal areas (the spaces in the whole of the shape). These equal areas need to be expressed as unit fractions of the whole shape, i.e., describe each part of a shape partitioned into four parts as 1/4 of the area of the shape.

Have students draw different shapes and see how many ways they can partition the shapes into parts with equal area.

2.G.3 (Prior Grade Standard)

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.

4.G.3 (Future Grade Standard)

N/A (deleted standard)