



# Mathematics Curriculum

## Ogdensburg Borough School District

Adopted 8/25/09, Revised 8/30/11, Adopted 9/4/2012, Adopted 10/16

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## RATIONALE

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The mathematics program prepares students to possess numeracy literacy, understand and apply math skills through high school, and competently utilize math in personal, work, and civic life. The program, which mirrors the Common Core Content Standards and Standards for Mathematical Practice, expects students to be proficient at each grade level accompanied by strong support.

The curriculum buttresses a program that entices students to love math and enjoy the learning of math and mathematical discovery. The program strives to lead students to become collaborative learners who can both lead and follow each other to uncover math truths and postulates. Simultaneously, students develop methodologies that assist and develop perseverance in problem solving.

Technologically driven tools and texts assist students to develop twenty-first century aptitude and proficiency. Math literacy is necessary for students to function as adults and mathematical competence opens doors to a productive future.

The Math Program assists students in problem solving, communication, and reasoning through kinesthetic, visual, and aural techniques. The curriculum strives to develop students who can improve community and are vital to the development of our country's future. Ultimately, the integration of technology cultivates students who are self-efficacious mathematicians.

**VISION:** To enable all of Ogdensburg's students to be successful using mathematical skills, understandings, practices, and attitudes in their twenty-first century daily lives and careers by teachers maintaining high expectations.

**MISSION:** The mission of Ogdensburg Borough School is to work collaboratively across grade levels to deliver excellent education in mathematics. The importance of mathematics in the students' futures requires a multi-faceted approach to instruction and assessment bearing in mind the personal skills that will be needed in the twenty-first century.

## EIGHT STANDARDS OF MATHEMATICAL PRACTICE

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**1. Make sense of problems and persevere in solving them.**

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.

**2. Reason abstractly and quantitatively.**

Mathematically proficient students make sense of quantities and their relationships in problem situations.

**3. Construct viable arguments and critique the reasoning of others.**

Mathematically proficient students understand and utilize standard assumptions, definitions, and previously established results in constructing arguments.

**4. Model with mathematics**

Mathematically proficient students can apply mathematics they know to solve problems arising in everyday life, society, and the workplace.

**5. Use appropriate tools strategically**

Mathematically proficient students consider the available tools when solving a mathematical problem.

**6. Attend to precision**

Mathematically proficient students try to communicate precisely to others

**7. Look for and make uses of structure.**

Mathematically proficient students look closely to discern a pattern or structure.

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

Mathematically proficient students notice if calculations are repeated and look both for general methods and for shortcuts.

### INSTRUCTIONAL OBJECTIVES

**TI** Present activities that build self efficacy and perseverance in mathematics.

**TI** Provide situations that develop critical thinking, reasoning, analysis, and quantitative acumen.

**TI** Utilize activities that develop aural, verbal, and kinesthetic learning.

**TI** Promote mathematical independence and bolster critical thinking skills.

**TI** Integrate technology to build 21<sup>st</sup> century competence.

**TI** Utilize collaborative situations to enhance and strengthen mathematical investigations.

**TI** Provide activities as underpinning for procedural skills.

**TI** Actively engage students in communicating mathematical procedures.

**TI** Offer mathematical problems where students can synthesize material and apply to real world contexts

# Mathematics Curriculum

## Kindergarten

## Structure

### Disciplinary Concepts

- Counting and re-ordering numbers
- Counting and pairing numbers with objects as you count.
- Compare sizes, amounts, and number values.
- Fluent in addition and subtraction
- Use groups of ten in base ten
- Classify objects
- Objects can be classified by shape
- Shapes' attributes: composition, similarities and differences, corners, and edges

### Enduring Understanding

Students will understand that...

- Counting finds the answer to “how many?”
- Successive numbers pair with the next object.
- Each object can only be paired with a single number.
- Cardinal words represent another form of counting.
- Determine which group has a greater number (or smaller) of objects. Identify which number name is larger (or smaller, or equal to).
- Represent addition and subtraction in kinesthetic, aural, and visual ways.
- Analyze math problems utilizing pictures or objects.
- Demonstrate composing and decomposing numbers from 11 to 19 into a ten plus additional ones.
- Sort objects by specific attributes.
- Describe shapes in everyday environment. State relative positions (listed in KG1).
- Identify shapes as flat or three dimensional.
- Many objects in the world are made of basic geometric shapes and can be compared.

## Structure

### Essential Questions

- How do you count objects?
- What is the next number?
- What object is first (second, third, etc.)?
- How many objects are in the arrangement?
- Which group is larger? Which number is smaller?
- What is addition? What is subtraction? How do you add? How do you subtract?
- How can pictures help solve math problems?
- How many ones are in a group of ten? How do you separate 17 into a ten plus additional ones?
- What are different attributes you can use to sort objects?
- What are the names of shapes? What do the shapes look like? Which shapes are flat shapes? Which shapes are solid?
- How can two shapes be different? What shapes can make another shape?
- How does counting help me in life?
- What can be measured around me?
- What shapes do I see in the community?
- How can I compose or decompose a number to solve a real life problem?

### Kindergarten Overview

Domain	Cluster Headings
<b>Counting and Cardinality</b>	<ul style="list-style-type: none"> <li>• Know number names and the count sequence.</li> <li>• Count to tell the number of objects.</li> <li>• Compare numbers.</li> </ul>
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"> <li>• Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</li> </ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"> <li>• Work with numbers 11-19 to gain foundations for place value.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• Describe and compare measurable attributes.</li> <li>• Work with money.</li> </ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"> <li>• Classify objects and count the number of objects in categories</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>• Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, spheres).</li> <li>• Analyze, compare, create, and compose shapes.</li> </ul>

KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Counting and Cardinality</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Know number names and the count sequence</b>		
<b>Performance Expectations</b>		
<b>K.CC.A.1</b> Count to one hundred by ones and by tens.	<b>K.CC.A.2</b> Count forward beginning from a given number within the known sequence (instead of having to begin at one).	<b>K.CC.A.3</b> Write numbers from zero to twenty. Represent a number of objects with a written numeral from 0 to 20 (with zero representing a count of no objects).
<b>Performance Expectations Assessment</b>		
Count to one hundred by ones. Count to one hundred by tens	Count by ones to 40 starting with the number 22. Count by tens to 100 starting with the number 30.	Write the numbers zero to twenty.
<b>Standards for Mathematical Practice: MP2 - Reason quantitatively; MP6 - Attend to precision; MP7 - Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Counting and Cardinality</b>
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<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Count to tell the number of objects.</b>			
<b>Performance Expectations</b>			
<b>K.CC.B.4a</b> Understand the relationship between numbers and quantities; connect counting to cardinality. <b>a.</b> When counting objects, say the number names in order and pair each object with one number name and each number name with one and only one object.	<b>K.CCB.4b</b> Understand the relationship between numbers and quantities; connect counting to cardinality. <b>b.</b> Understand that the last number named tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	<b>K.CC.B.4c</b> Understand the relationship between numbers and quantities; connect counting to cardinality. <b>c.</b> Understand that each successive number name refers to a quantity that is one larger.	<b>K.CC.B.5</b> Count to answer “how many” for as many as 20 things arranged in a line, a rectangular array, a circle, or as many as 10 objects in a scattered configuration. Given a number from 1 – 20, count out that many objects.
<b>Performance Expectations Assessment</b>			
Count the people in line starting with the word “first”. Count each object in the picture.	How many objects have you already counted?	You have 5 objects on your desk. If you add one, how many will you have?	Look at the objects in the picture. Count the objects. How many are in the picture?
<b>Standards for Mathematical Practice: MP2 - Reason quantitatively; MP6 - Attend to precision; MP7 - Look for and make use of structure.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

## KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Counting and Cardinality</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Compare numbers</b>		
<b>Performance Expectations</b>		



<b>K.CC.C.6</b> Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another groups, e.g., by using matching and counting strategies.	<b>K.CC.C.7</b> Compare two numbers between 1 and 10 presented as written numerals.
<b>Performance Expectations Assessment</b>	
Count the objects in both piles. Which group has more (or less)?	Given three and seven, which number is greater than (or less than)?
<b>Standards for Mathematical Practice: MP2 - Reason quantitatively; MP6 - Attend to precision; MP7 - Look for and make use of structure.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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## KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</b>		
<b>Performance Expectations</b>		

<b>K.OA.A.1</b> Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g. claps), and acting out situations, verbal explanations, expressions, or equations.	<b>K.OA.A.2</b> Solve addition and subtraction word problems, and add and subtract within 10 (by counting objects or drawing) to represent the problem. 🌱	<b>K.OA.A.3</b> Decompose numbers less than or equal to 10 into pairs in more than one way (by using objects or drawings) and record each decomposition by a drawing or equation ( $5 = 2 + 3$ and $5 = 4 + 1$ ).	<b>K.OA.A.4</b> For any number from 1 to 9, find the number that makes 10 when added to the given number, (by using objects or drawings), and record the answer with a drawing or equation.	<b>K.OA.A.5</b> Proficiently add and subtract within 5.
<b>Performance Expectations Assessment</b>				
Show me $3 + 2$ . (utilize K.OA.1 processes)	If you have nine apples and I take one apple, how many apples will you have?	Show me three ways to make the number 8.	How many do I add to 6 to make ten?	Subtract 3 from 4. (Students are expected to answer within three seconds.)
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.</b>				
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

## KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Number and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Work with numbers 11-19 to gain foundations for place value.</b>		
<b>Performance Expectations</b>		

**K.NBT.A.1**

Compose and decompose numbers from 11 to 19 into ten ones plus some further ones. Show each composition and decomposition with objects, drawings, or equations.

**Performance Expectations Assessment**

Show me a group of ten ones plus more ones to make 14. (Use objects, drawings, or equations.)

Show your partner a group of tens and additional ones to make 16. Your partner should agree or critique.

**Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with mathematics. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Describe and compare measurable attributes.</b>		
<b>Performance Expectations</b>		

<b>K.M.A.1</b> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	<b>K.M.A.2</b> K.M.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference.
<b>Performance Expectations Assessment</b>	
Find an object in the room. Describe the object using words such as long or heavy.	Compare the heights of two students. Explain which child is shorter (or taller). Find two objects in the room that you can pick up. Which object is heavier (or lighter)?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP4 - Model with mathematics. MP5 Use appropriate tools strategically. MP6 - Attend to precision.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

## KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Work with money.</b>		
<b>Performance Expectations</b>		
<b>K.M.B.3</b> Understand that certain objects are coins and dollar bills, and that coins and dollar bills represent money. Identify the values of all U.S. coins and the one-dollar bill.		
<b>Performance Expectations Assessment</b>		

Match the picture of the coin or dollar bill to their correct value.

**Standards for Mathematical Practice: MP4 - Model with mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

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## KINDERGARTEN CURRICULUM

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**Content Area: Mathematics**

**Grade Level: K**

**Domain: Data Literacy**

**21<sup>st</sup> Century Theme:** Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.

**Standard: Classify objects and count the number of objects in each category.**

### Performance Expectations

**K.DLA.1**

Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. (Clarification: Limit category counts to be less than or equal to 10) 🌱

### Performance Expectations Assessment

Group the beans according to color and write the number in each group.

**Standards for Mathematical Practice: MP4 - Model with mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres.)</b>		
<b>Performance Expectations</b>		
<b>K.G.A.1</b> Describe objects in the environment using names of shapes and describe the relative positions of these objects (above, below, beside, in front of, behind, and next to).	<b>K.G.A.2</b> Correctly name shapes regardless of their orientations or overall size.	<b>K.G.A.3</b> Identify shapes as two-dimensional (lying in a plane “flat” or three-dimensional “solid”).
<b>Performance Expectations Assessment</b>		
Stand “in front of” your chair. Find another rectangle in the room (use all shape names).	Draw a triangle. Now, draw the triangle upside down.	Find a flat shape in the room. Find a solid shape in the room.
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP4 - Model with mathematics. MP7 - Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

KINDERGARTEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: K</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Analyze, compare, create, and compose shapes.</b>		
<b>Performance Expectations</b>		
<b>K.G.B.4</b> Analyze and compare two- and three-dimensional shapes using informal language to describe the similarities and differences, parts (number of sides, vertices/corners) and other attributes (sides of equal length)	<b>K.G.B.5</b> Model shapes in the world by building shapes from components (e.g. sticks and clay balls) and drawing shapes. 🌱	<b>K.G.B.6</b> Compose simple shapes to form larger shapes. (e.g. Can you join these two triangles with full sides touching to make a rectangle?)
<b>Performance Expectations Assessment</b>		
Find two shapes in the room. How are the shapes similar? How are the shapes different?	Create a hexagon with popsicle sticks.  Create a cube with toothpicks and marshmallows (other materials can be substituted).	Use two books to make a rectangle.
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP4 - Model with mathematics. MP7 - Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

# **Mathematics Curriculum**

## **Grade One**



## Structure

### Disciplinary Concepts

- Model and solve problems involving addition and subtraction
- Understand the relationship between addition and subtraction
- Add and subtract fluently using numerals 0 to 10
- Add and subtract using numerals 0 to 20
- Use strategies to add to 100
- Subtract multiples of 10 from numbers 10 to 100
- Compare whole numbers to at least 100
- Explain addition and subtraction equations
- Extend the counting sequence to 120
- Understand place value for ones, tens, and hundreds
- Measure lengths indirectly
- Tell and write time
- Represent and interpret data
- Reason with shapes and their attributes
- Use mental math to add or subtract using numerals 0 to 10

### Enduring Understanding

Students will understand that...

- Real life problems can be solved with addition and subtraction.
- Objects can model addition and subtraction.
- Fact families assist in computation.
- Fluency in addition and subtraction is vital.
- A symbol or variable can take the place of an unknown number.
- Hundreds, tens, and ones hold place value in a two and three digit number.

- Numbers can be compared ( $<$   $>$   $=$ ).
- Lengths can be measured and compared.
- Clocks tell hours and half hours in analog and digital formats.
- Organizing data into a chart enables comparison of the information.
- Figures can be closed or open.
- Figures can be partitioned to make other shapes.
- Figures can be composed from other figures.
- Addition and subtraction represent real world problems.
- Number sentences are used to calculate in math.
- Place value is necessary in mathematics.

### Essential Questions

- How do you add in base ten?
- What strategies do you use to add three whole numbers?
- What are the first three place values?
- What is the relationship between addition and subtraction (fact family)?
- Why are addition and subtraction related?
- Why can a symbol or letter represent an unknown number?
- What number occurs after 99?
- Do you add 10 to the ones or tens place?
- How can you measure objects?
- How do you decide which object is shorter (or longer)?
- What is the difference between the two types of clocks?
- Where is the minute hand for an hour? For a half hour?
- How does a chart show information?
- How do you read a graph?
- Can you name a closed shape?
- What does a half, quarter, and fourth of an object describe?
- How do addition and subtraction sentences represent real world problems?
- How do we solve addition and subtraction problems?
- How are addition and subtraction related?
- How do you decide if a number sentence is accurate?
- How does place value help to solve addition and subtraction?

## Grade 1 Overview

Domain	Cluster Headings
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"><li>• Represent and solve problems involving addition and subtraction.</li><li>• Understand and apply properties of operations and the relationship between addition and subtraction.</li><li>• Add and subtract within 20.</li><li>• Work with addition and subtraction equations.</li></ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"><li>• Extend the counting sequence.</li><li>• Understand place value.</li><li>• Use place value understanding and properties of operations to add and subtract.</li></ul>
<b>Measurement</b>	<ul style="list-style-type: none"><li>• Measure lengths indirectly and by iterating length units.</li><li>• Tell and write time.</li><li>• Work with money.</li></ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"><li>• Represent and interpret data.</li></ul>
<b>Geometry</b>	<ul style="list-style-type: none"><li>• Reason with shapes and their attributes.</li></ul>

GRADE ONE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and solve problems involving addition and subtraction</b>		
<b>Performance Expectations</b>		
<b>1.OA.A.1</b> Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions (using objects, drawings, equations with symbol for the unknown). 🌱	<b>1.OA.A.2</b> Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (using objects, drawings, equations with symbol for the unknown). 🌱	
<b>Performance Expectations Assessment</b>		
Jane had 19 apples. She gave some to Sally. Jane has 8 left. How many did she give Sally? (Show with cubes. Show with a drawing. Write an equation, e.g. $19 - a = 8$ .)	Jim has 8 pens. Jay has 6 pens. Jake has 9 pens. How many pens do the boys have in all? Show with cubes. Show with a drawing. Write an equation, e.g. $8+6+9 = p$	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE ONE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand and apply properties of operations and the relationship between addition and subtraction.</b>		

Performance Expectations	
<b>1.OA.B.3</b> Apply properties of operations as strategies to add and subtract.	<b>1.OA.B.4</b> Understand subtraction as an unknown-addend problem.
Performance Expectations Assessment	
If $8 + 5$ is 13. What is $5 + 8$ (Commutative Property)? To add $6 + 7 + 4$ what do I add first? ( $6+4$ to make ten - Associative Property)	If I can subtract 8 from 11, what do I add to 8 to equal 11?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE ONE CURRICULUM

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Content Area: Mathematics	Grade Level: 1	Domain: Operations and Algebraic Thinking
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Add and subtract within 20</b>		
Performance Expectations		
<b>1.OA.C.5</b> Relate counting to addition and subtraction.	<b>1.OA.C.6</b> Add and subtract within 20, demonstrating accuracy and efficiency for addition and subtraction within 10. Use strategies such as counting on, making ten, decomposing a number, using the relationship between addition and subtraction.	
Performance Expectations Assessment		

Count on from 2 to add three to 2 ( $2 + 3$ ).	Write a fact family for $12 + 3 = 15$ . $8 + 6 = 8 + 2 + 4 = 10 + 4$ (decomposing).
<b>Standards for Mathematical Practice:</b> MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP6 - Attend to precision. MP8 - Look for and express regularity in repeated reasoning.	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Work with addition and subtraction equations.</b>		
<b>Performance Expectations</b>		
<b>1.OA.D.7</b> Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.	<b>1.OA.D.8</b> Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.	
<b>Performance Expectations Assessment</b>		
True or false? $13 = 13$ $7 = 8 - 1$ $10 - 6 = 4$	What number makes the equation true? $8 + ? = 11$ $12 - 2 = ?$	
<b>Standards for Mathematical Practice:</b> MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.		

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE ONE CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level:</b>	<b>Domain: Number and Operations in Base Ten</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Extend the counting sequence.</b>					
<b>Performance Expectations</b>					
<b>1.NBT.A.1</b> Count to 120, starting at any number less than 120, in this range, read and write numerals and represent a number of objects with written numerals.	<b>1.NBT.B.2a</b> Understand that the two digits of a two-digit number represent amounts of tens and ones <b>a.</b> where 10 can be thought of as a bundle of ten ones (called a “ten”).	<b>1.NBT.B.2b</b> Understand that the two digits of a two-digit number represent amounts of tens and ones <b>b.</b> where the numbers 11 to 19 are composed of a ten bundle and one to nine additional ones.	<b>1.NBT.B.2c</b> Understand that the two digits of a two-digit number represent amounts of tens and ones <b>c.</b> where the tens numbers 10 to 90 refer to 1 to 9 tens (with zero ones).	<b>1.NBT.B.3</b> Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $<$ $>$ $=$ .	
<b>Performance Expectations Assessment</b>					
Count to 120 beginning with 98.	Write the number 23. Draw a line through the number to separate the tens and ones.	Show the numbers 17 with your cubes (group of ten plus 7 ones).	Draw the number 80 (student draws 8 piles of ten).	Which number is greater 45 or 74? Draw a compare sign between the two numbers.	
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b>					
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE ONE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Numbers and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use place value understanding and properties of operations to add and subtract.</b>		
<b>Performance Expectations</b>		
<b>1.NBT.C.4</b> Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models, drawings, base ten strategies, properties of operations, and/or the relationship between addition and subtraction.	<b>1.NBT.C.5</b> Given a two-digit number find 10 more or 10 less than the number mentally, without having to count; explain the reasoning used.	<b>1.NBT.C.6</b> Subtract multiples of 10 in the range 10 – 90 using concrete models, drawings, base ten strategies, properties of operations, and relationship between addition and subtraction. Apply the strategy, write the equation, explain the reasoning used.
<b>Performance Expectations Assessment</b>		
Add 82 + 6. Add 70 + 10.	What is 80 plus 10? Explain how you added.	Show 80 minus 20 (use the above methods). Then, write the equation.
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

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GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Measure lengths indirectly and by iterating length units.</b>		
<b>Performance Expectations</b>		



<p><b>1.M.A.1</b> Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p>	<p><b>1.M.A.2</b> Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object end to end. Understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.</p>
<b>Performance Expectations Assessment</b>	
<p>Order three pencils by size, shortest to longest. Measure your knee to your ankle with string; compare the length to another student's leg length.</p>	<p>Measure the leg of your desk with blocks. Discuss with a partner why your blocks must be the same size.</p>
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b></p>	
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>	

GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Measurement</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts support competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Tell and write time.</b></p>		
<b>Performance Expectations</b>		
<p><b>1.MD.B.3</b> Tell and write time in hours and half-hours using analog and digital clocks.</p>		
<b>Performance Expectations Assessment</b>		

What time does the clock show?  
Write the time 3:45.

**Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

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## GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts support competent engagement in future personal, work and civic life.		
<b>Standard: Work with money.</b>		
<b>Performance Expectations</b>		
<b>1.M.C.4</b> Know the comparative values of coins and all dollar bills. Use appropriate notation (e.g., 69¢, \$10).	<b>1.M.C.5</b> Use dollars in the solutions of problems up to \$20. Find equivalent monetary values. Show monetary values in multiple ways.	
<b>Performance Expectations Assessment</b>		
Which has a greater value, quarter 25¢ or dime 10¢?	How many pennies are equal to a nickel? Show 25¢ as two dimes and one nickel, and as five nickels. Show \$20 as two tens and as 20 ones.	

**Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

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GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 1</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and interpret data</b>		
<b>Performance Expectations</b>		
<b>1.MD.C.4</b> Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. 🌱		
<b>Performance Expectations Assessment</b>		
Make a chart by coloring the blocks. Look at the chart. How many students have cats? Tell me what type of pet more students have.		
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE ONE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level:</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Reason with shapes and their attributes</b>		
<b>Performance Expectations</b>		
<b>1.G.A.1</b> Distinguish between defining attributes versus non-defining attributes; build and draw shapes that possess defining attributes. (closed/open, overall size, corners, sides)	<b>1.G.A.2</b> Compose two and three-dimensional shapes to create a composite shape, and compose new shapes from the composite shape. (rectangles, squares, trapezoids, triangles, half circles, quarter circles, cubes, right rectangular prism, right circular cones, right circular cylinders)	<b>1.G.A.3</b> Partition circles and rectangles into two and four equal shares, describe the shares using the words <i>halves, fourths, and quarters</i> . Use the phrases <i>half of, fourth of, and quarter of</i> . Describe the whole as two of or four of the shares. Understand that decomposing into more equal shares creates smaller shares.
<b>Performance Expectations Assessment</b>		
Tell your partner how many corners are on the pattern block.	Pick two pattern blocks out of the bag. Work with a partner to create another shape that you can identify.	Cut your circle into four equal parts. Pick up 2 pieces. How much of the circle is left?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

# Mathematics Curriculum

## Grade Two

## Structure

### Disciplinary Concepts

- Add and subtract fluently using numerals 0 to 100
- Solve one and two step word problems
- Identify odd and even numbers (up to 20)
- Understand that numbers in base ten have ones, tens, hundreds, and thousands
- Add and subtract using numerals 0 to 1000 using strategies
- Count within 1000 by 5s, 10s, and 100s
- Compare numbers of two and three digits
- Fluently add and subtract within 100 using strategies
- Mentally add and subtract using 10 and 100
- Measure and estimate lengths with standard units (standard and metric)
- Use a number line to understand length
- Read and write time
- Read and write money
- Draw and read bar graphs
- Recognize shapes and their attributes
- Create rectangular arrays to show multiplication

### Enduring Understanding

Students will understand that...

- Fluency in mathematics is necessary.
- Creating equal groups models multiplication.
- Three digit numbers represent ones, tens and hundreds.
- 1000 occurs after 999.
- Comparing three digit numbers starts with the hundreds place.

- Fact families within 100 assist in subtracting.
- Mental addition and subtraction is useful.
- Objects can be measured with standard measurement units.
- A number line can demonstrate length.
- Hour and minute hands assist in telling time.
- Money symbols must be used appropriately.
- A bar graph shows data.
- Shapes can be open or closed.
- Shapes can make other shapes.
- Shapes can be divided into halves, fourths (or quarters).
- Shapes are found in daily life and can be measured to solve problems.
- Measuring distance, time, money, and data assist in real world problems.
- Most careers use math operations and/ or place value on a daily basis.

### Essential Questions

- How do you solve a two step problem?
- How do two single digits create a double digit?
- How do you write rows and columns as an equation?
- What does skip counting mean?
- How do you add two two-digit numbers?
- Where do you add 100 in a three digit number?
- How does measuring with different size units affect the answer?
- How can you estimate length without a ruler?
- What do the two hands on a clock tell?
- What are two symbols used with money?
- How do you add information on a graph?
- What are the parts of closed shapes?
- Can shapes be divided equally into halves or quarters?
- Why do people use specific shapes for specific tasks?
- Do all cultures use time, money, data, and measurement in the same ways?
- Why are math calculations necessary in most careers?

## Grade 2 Overview

Domain	Cluster Headings
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"> <li>• Represent and solve problems involving addition and subtraction.</li> <li>• Add and subtract within 20.</li> <li>• Work with equal groups of objects to gain foundations for multiplication.</li> </ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"> <li>• Understand place value.</li> <li>• Use place value understanding and properties of operations to add and subtract.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• Measure and estimate lengths in standard units.</li> <li>• Relate addition and subtraction to length.</li> <li>• Work with time and money.</li> </ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"> <li>• Understand concepts of data.</li> <li>• Represent and interpret data.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>• Reason with shapes and their attributes.</li> </ul>

### GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and solve problems involving addition and subtraction.</b>		
<b>Performance Expectations</b>		
<b>2.OA.A.1</b> 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. 🌱		
<b>Performance Expectations Assessment</b>		



Write an equation using a symbol (preferably a letter) for the unknown.  
Draw pictures to show the problem  $23 + 41$ .

**Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

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## GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Add and subtract within 20</b>		
<b>Performance Expectations</b>		
<b>2.OA.B.2</b>  Fluently add and subtract within 20 using mental strategies (see 1.OA.C.6 for mental strategies). By end of Grade 2, know from memory all sums of two one-digit numbers.		
<b>Performance Expectations Assessment</b>		

Add 34 and 41.  
Subtract 13 from 90. Answer within 5 seconds.

**Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Work with equal groups of objects to gain foundations for multiplication.</b>		
<b>Performance Expectations</b>		
<b>2.OA.C.3</b> Determine whether a group of objects (up to 20) has an odd or even number of members (by pairing objects or counting by 2s); write an equation to express an even number as a sum of two equal addends.	<b>2.OA.C.4</b> 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.	
<b>Performance Expectations Assessment</b>		
Place 13 blocks on your desk. Is there an odd or even number of blocks? Pair them off to decide.	Line up 4 rows with 3 blocks in each. How many columns are there? Write an equation to show the addition of the blocks.	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE TWO CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 2</b>	<b>Domain: Number and Operations in Base Ten</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Understand place value.</b>					
<b>Performance Expectations</b>					
<b>2.NBT.A.1a</b> Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones <b>a.</b> where 100 can be thought of as ten tens – called a hundred.	<b>2.NBT.A.1b</b> Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones <b>b.</b> where hundred numbers (100, 200,...900) refer to 1 to 9 hundreds with zero tens and ones.	<b>2.NBT.A.2</b> Count within 1000; skip count by 5s, 10s, and 100s.	<b>2.NBT.A.3</b> Read and write numbers to 1000 using base-ten numerals, number names, and expanded forms.	<b>2.NBT.A.4</b> Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits using $<$ $>$ $=$ to record results of the comparison.	
<b>Performance Expectations Assessment</b>					
Separate the number 258 by adding hundreds, tens, and ones ( $200 + 50 + 8$ ).	Show a pile of 200 with zero tens and zero ones.	Starting at 821, count to 1000. Count to 1000 by tens starting at 750..	Write the number 823 in numerals. Write the number 145 in words. Write an equation adding hundreds, tens, and ones for the number 319 ( $300 + 10 + 9$ ).	Place the comparison symbol between the numbers 312 and 327.	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>					
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					


<b>Content Area: Mathematics</b>		<b>Grade Level: 2</b>		<b>Domain: Number and Operations in Base Ten</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Use place value understanding and properties of operations to add and subtract.</b>					
<b>Performance Expectations</b>					
<b>2.NBT.B.5</b> With accuracy and efficiency, add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.		<b>2.NBT.B.6</b> Add up to four two-digit numbers using strategies based on place value and properties of operations.		<b>2.NBT.B.7</b> Add and subtract using numbers up to 1000, using concrete models, drawing, strategies based on place value, properties of operations, and the relationship between addition and subtraction.  Understand that in adding or subtracting three-digit numbers, one subtracts within the appropriate place values or by decomposing a number.	
				<b>2.NBT.B.8</b> Mentally add 10 or 100 to a given number from 100-900 and mentally subtract 10 from a given number between 100-900.	
				<b>2.NBT.B.9</b> Explain why addition and subtraction strategies work, using place value and the properties of operations (supported by drawings or objects).	
<b>Performance Expectations Assessment</b>					
The picture shows islands connected by bridges. To cross a bridge, you must pay a toll in coins. If you start on the island marked in blue with 100 coins, how can you make it to the island marked in red?		Add $12 + 24 + 30 + 17$ . Show addition of ones and tens.		Subtract 138 from 999. Show your work by drawing pictures.	
				$824 - 100 = ?$	
				Draw a picture to show why adding $100 + 20 + 3 + 200 + 60 + 2 = 123 + 262$ .	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>					
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE TWO CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 2</b>		<b>Domain: Measurement</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Measure and estimate lengths in standard units.</b>					
<b>Performance Expectations</b>					
<b>2.M.A.1</b> Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.		<b>2.M.A.2</b> Measure the length of an object twice, using units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.		<b>2.M.A.3</b> Estimate lengths using units of inches, feet, centimeters, and meters.	
<b>2.M.A.4</b> Measure to determine how much longer one object is than another. Express the length difference in terms of a standard length unit.					
<b>Performance Expectations Assessment</b>					
What is the length of your desk top in inches?		What is the length of your desk top in inches and in centimeters? Explain why the number of centimeters is greater.		How many inches do you estimate your shoe to be? How many centimeters?	
Choose an object in the room and measure it. Compare your object to your partner’s. Which object has a longer measurement?					
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b>					
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE TWO CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 2</b>		<b>Domain: Measurement</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Relate addition and subtraction to length.</b>					

<b>Performance Expectations</b>	
<p><b>2.M.B.5</b> Use addition and subtraction using numbers up to 100 to solve word problems involving lengths that are given in the same units. Use drawings (draw a ruler) and equations with a symbol for the unknown.</p> 	<p><b>2.M.B.6</b> Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to numbers. Represent sums and differences on the number line.</p>
<b>Performance Expectations Assessment</b>	
<p>If a rectangular yard is 13 feet long and the width is 2 less than the length, what is the measurement of the width? Write an equation for the problem.</p>	<p>What is <math>35 - 12</math>? Show your answer using a number line.</p>
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b></p>	
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>	

GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Measurement</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Work with time and money</b></p>		
<b>Performance Expectations</b>		

<p><b>2.M.C.7</b> Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.</p>	<p><b>2.M.C.8</b> Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies. Use \$ and ¢ symbols appropriately.</p>
<b>Performance Expectations Assessment</b>	
What time does the clock tell? Write the time on your board.	If you have two dimes and four pennies, how many cents do you have?
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b></p>	
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>	

GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Data Literacy</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Understand concepts of data.</b></p>		
<b>Performance Expectations</b>		

<b>2.DLA.1</b> Understand that people collect data to answer questions. Understand that data can vary.	<b>2.DLA.2</b> Identify what could count as data (e.g., visuals, sounds, numbers).
<b>Performance Expectations Assessment</b>	
What question can you ask to collect data?	State what data you are looking for in the following questions: How many pets do the students in your class have? (numbers) What type of pets do the students in your class have? (visuals/ type of animal)
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and interpret data.</b>		
<b>Performance Expectations</b>		



<p><b>2.DL.B.3</b> 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 making a line plot, where the horizontal scale is marked off in whole number units.</p>	<p><b>2.DL.B.4</b> Draw a picture graph and a bar graph to represent a data set with up to four categories. Solve simple put-together, take –apart, and compare problems using information presented in the graph. 🌱</p>
<p><b>Performance Expectations Assessment</b></p>	
<p>Measure your crayon. What is the length? Record the length of your crayon and 5 other students' crayons on a line plot.</p>	<p>Draw a bar graph and a picture graph to represent how many people live in 5 students' houses. Who has the most people? Who has the least?</p>
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure.</b></p>	
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>	

GRADE TWO CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 2</b>	<b>Domain: Geometry</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Reason with shapes and their attributes.</b></p>		
<p><b>Performance Expectations</b></p>		

<p><b>2.G.A.1</b> Recognize and draw shapes having specified attributes, such as a given number of angles, sides, or faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.</p>	<p><b>2.G.A.2</b> Partition a rectangle into rows and columns of same size squares and count to find the total number of partitions.</p>	<p><b>2.G.A.3</b> Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves</i>, <i>thirds</i>, <i>half of</i>, <i>a third of</i>, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</p>
<p><b>Performance Expectations Assessment</b></p>		
<p>What shape has 5 angles? Draw the shape.</p>	<p>Use your ruler to mark squares on your rectangle. What is the total area of the rectangle?</p>	<p>Cut a rectangle in half. Now cut the rectangle into fourths. One half equals how many fourths?</p>
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically.</b></p>		
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>		

# **Mathematics Curriculum**

## **Grade Three**

## Structure

### Disciplinary Concepts

- Understanding multiplication and division
- Properties of multiplication
- Fluently multiply and divide all one digit numbers
- Solve two step problems and use patterns
- Understanding place value
- Fractions as numbers
- Measurement and estimation
- Graphs and data
- Geometric measurement: area and perimeter
- Geometric shapes and their attributes

### Enduring Understanding

Students will understand that...

- Word problems can use multiplication and division.
- Pictures can be drawn to solve multiplication and division problems.
- Properties of multiplication are strategies that can be helpful when solving larger multiplication problems.
- Use strategies to assist in gaining fluency in multiplication and division facts.
- Word problems often have more than one operation involved when solving.
- Properties of operations can assist in finding patterns.
- Patterns can be identified and described.
- Place value can assist when rounding, using strategies or algorithms to multiply and divide.
- Fractions are numbers that can be shown on a number line.
- Equal fractions will be at the same point on a number line.
- Whole numbers can be written as fractions.
- Estimation can be used to help analyze measurements.
- Graphs are helpful in representing and interpreting data.
- Area is related to multiplication and addition.
- Perimeter and area are different.

- Shapes have different attributes.
- Shapes can be broken into equal pieces and represented as a fraction.
- Math operations are used in daily life.
- Fractions represent portional measurement in real life.
- Shapes and their attributes have specific meanings.
- Measurement and data helps to build analysis skills.


### Essential Questions

- What situation could represent a multiplication/ division problem?
- How is a missing number determined in an equation?
- What are the properties of multiplication?
- How can multiplication help find the answer to a division problem?
- What are ways to memorize multiplication?
- What are ways to memorize division?
- How can a word problem include more than one operation?
- What are ways to find patterns in addition and multiplication?
- What properties of operations help identify patterns?
- How do you round using place value?
- How is a fraction a number?
- How can fractions be represented?
- How does estimation help with measurement?
- What do graphs provide?
- How are area and perimeter related?
- What are different attributes of shapes?
- How do addition and subtraction relate?
- Where are fractions found in everyday life?
- How do shapes represent items or concepts in the world around us?
- Why do we analyze data?

### Grade 3 Overview

Domain	Cluster Headings
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"> <li>● Represent and solve problems involving multiplication and division.</li> <li>● Understand properties of multiplication and the relationship between multiplication and division.</li> <li>● Multiply and divide within 100.</li> <li>● Solve problems involving the four operations and identify and explain patterns in arithmetic.</li> </ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"> <li>● Use place value understanding and properties of operations to perform multi-digit arithmetic.</li> </ul>
<b>Number and Operations - Fractions</b>	<ul style="list-style-type: none"> <li>● Develop understanding of fractions as numbers. <ul style="list-style-type: none"> <li>○ Denominators of 2, 3, 4, 6, and 8)</li> </ul> </li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>● Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</li> <li>● Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</li> <li>● Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</li> </ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"> <li>● Understand data-based questions and data collection.</li> <li>● Represent and interpret data.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>● Reason with shapes and their attributes.</li> </ul>

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Operations and Algebraic Thinking</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.				
<b>Standard: Represent and solve problems involving multiplication and division.</b>				
<b>Performance Expectations</b>				
<b>3.OA.A.1</b> Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each.	<b>3.OA.A.2</b> Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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.	<b>3.OA.A.3</b> 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. 	<b>3.OA.A.4</b> Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	
<b>Performance Expectations Assessment</b>				
Describe a situation where a total number of objects can be expressed as $5 \times 8$ .	Describe a situation where a number of groups can be expressed as $64 \div 8$ .	Create a word problem using multiplication (or division) and have another student answer the problem by drawing a picture and writing the equation. (Switch roles)	Determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$ $5 = ? \div 3$ $6 \times 6 = ?$ .	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP3- Construct viable arguments and critique the reasoning of others.</b>				
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Operations and Algebraic Thinking</b>		
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<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.	
<b>Standard: Understand properties of multiplication and the relationship between multiplication and division.</b>	
<b>Performance Expectations</b>	
<b>3.OA.B.5</b> Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known.(Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$ , then $15 \times 2 = 30$ , or by $5 \times 2 = 10$ , then $3 \times 10 = 30$ . (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$ , one can find $8 \times 7$ as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive property.)	<b>3.OA.B.6</b> Understand division as an unknown-factor problem.
<b>Performance Expectations Assessment</b>	
Give an example of the commutative property of multiplication, associative property of multiplication, and the distributive property.	Find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.
<b>Standards for Mathematical Practice: MP2- Reason abstractly and quantitatively; MP7- Look for and make use of structure.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Multiply and divide within 100.</b>		
<b>Performance Expectations</b>		



<b>3.OA.C.7</b> With accuracy and efficiency, multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
<b>Performance Expectations Assessment</b>
Give speed multiplication and division tests. (Students should be able to answer multiplication facts in 2 seconds.)
<b>Standards for Mathematical Practice: MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve problems involving the four operations, and identify and explain patterns in arithmetic.</b>		
<b>Performance Expectations</b>		
<b>3.OA.D.8</b> Solve two-step word problems, including problems involving money, using the four operations. 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. (Using whole numbers and students should know to follow Order of Operations). 	<b>3.OA.D.9</b> 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.)	
<b>Performance Expectations Assessment</b>		

Write a two step word problem. Use an equation with a variable representing an unknown amount. Have a partner solve the problem. (Switch roles)	Look at an addition table and multiplication table. Come up with two different patterns that you can find.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP3- Construct viable arguments and critique the reasoning of others.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Number and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use place value understanding and properties of operations to perform multi-digit arithmetic.</b>		
<b>Performance Expectations</b>		
<b>3.NBT.A.1</b> Use place value understanding to round whole numbers to the nearest10 or 100.	<b>3.NBT.A.2</b> Fluently add and subtract using numbers up to 1000 applying strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	<b>3.NBT.A.3</b> Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., $9 \times 80$ , $5 \times 60$ ) using strategies based on place value and properties of operations.
<b>Performance Expectations Assessment</b>		
Round the number 467 to the nearest ones, tens, and hundreds place.	What strategy could you use to subtract $1012 - 1003$ ? Add $1965 + 1257$ in five seconds.	What strategy would you use to solve $5 \times 40$ ? How does place value help you?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Number and Operations- Fractions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Develop understanding of fractions as numbers.</b>		
<b>Performance Expectations</b>		
<b>3.NFA.1</b> 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 $1/b$ . <b>For example: If a rectangle (i.e. the whole) is partitioned into 3 equal parts, identify that one part is <math>1/2</math> and two parts is <math>2/3</math>.</b>	<b>3.NFA.2a</b> Understand a fraction as a number on the number line; represent fractions on a number line diagram. <b>a.</b> 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>For example, partition the number line from 0 to 1 into 3 equal parts, represent <math>1/3</math> on the number line and show that each part has a size <math>1/3</math>.</b>	<b>3.NFA.2b</b> Understand a fraction as a number on the number line; represent fractions on a number line diagram. <b>b.</b> Represent a fraction $a/b$ 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.
<b>Performance Expectations Assessment</b>		
Explain what the numerator and denominator represent of each fraction: $1/2$ , $3/4$ , and $5/8$ . A rectangle is cut into 4 equal parts. What fraction represents 3 of those parts?	Draw a number line and show where $1/4$ would be. Split the line into equal parts and mark $3/4$ on the same line.	Show $4/5$ on a number line by first marking the 5 lengths and then finding the endpoint where $4/5$ would be.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 3</b>		<b>Domain: Number and Operations- Fractions</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Develop understanding of fractions as numbers.</b>					
<b>Performance Expectations</b>					
<b>3.NF.A.3a</b> Understand two fractions as equivalent (equal) if they are the same size. Understand two fractions as equivalent if they are located at the same point on a number line.		<b>3.NF.A.3b</b> Recognize and generate simple equivalent fractions <b>by reasoning about their size</b> , (e.g. $1/2 = 2/4$ , $4/6 = 2/3$ ). Explain why the fractions are equivalent <b>with the support of</b> a visual fraction model.		<b>3.NF.A.3c</b> Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	
<b>3.NF.A.3d</b> 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 with the support of a visual fraction model.					
<b>Performance Expectations Assessment</b>					
Describe two fractions that would fall on the same point on the number line.		Explain why the fractions $3/4$ and $6/8$ are equivalent, e.g., by using a visual fraction model.		Express 3 as a fraction. Explain what $5/5$ would be equivalent to.  Recognize that $6/1 = 6$ ; locate $4/4$ and 1 at the same point on a number line diagram.	
Which fraction is greater, $1/4$ or $3/4$ ? How do you know? Which fraction is greater, $1/8$ or $1/5$ ? How do you know?					
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>					
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</b>		
<b>Performance Expectations</b>		
<b>3.M.A.1</b> Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	<b>3.M.A.2</b> Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). <sup>6</sup> Add, subtract, multiply, or divide 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.	
<b>Performance Expectations Assessment</b>		
Use a number line to help solve the problem. Sarah started her chores at 4:30pm. It took her 7 minutes to fold laundry and 10 minutes to clean her room. What time was she finished?	If you fill a beaker with 11 liters of water and add 5 liters of water, how much water do you have? Estimate then solve.	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP5- Use appropriate tools strategically.</b>		
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		


GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</b>		
<b>Performance Expectations</b>		

<p><b>3.M.B.3</b> Recognize area as an attribute of plane figures and understand concepts of area measurement.</p> <ol style="list-style-type: none"> <li>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.</li> <li>A plane figure which can be covered without gaps or overlaps by unit squares is said to have an area of square units.</li> </ol>	<p><b>3.M.B.4</b> Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).</p>	<p><b>3.M.B.5</b> Relate area to the operations of multiplication and addition.</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths is the sum of <math>a \times b</math> and <math>b \times a</math>. Use area models to represent the distributive property in mathematical reasoning.</li> <li>Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</li> </ol>
<b>Performance Expectations Assessment</b>		
What is the difference between a unit and square units?	Draw a rectangle on grid paper. Measure how many square units the rectangle is.	Draw a rectangle that is 3in by 4 in. Fill in the tiles and come up with a strategy to find the area of a rectangle.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP5- Use appropriate tools strategically.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</b>		
<b>Performance Expectations</b>		
<b>3.M.C.6</b> 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. 		
<b>Performance Expectations Assessment</b>		
The area of a rectangle is 30 square feet. If the length is 5 feet, what is the width? Create a rectangle with an area of 30 square feet, but a different perimeter. What are the lengths of each side? Explain.		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE THREE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand data-based questions and data collection.</b>		
<b>Performance Expectations</b>		

<b>3.DL.A.1</b> Develop data-based questions and decide what data will answer the question.	<b>3.DL.A.2</b> Collect student-centered data (e.g. collect data on students' favorite ice cream flavor) or use existing data to answer data-based questions.
<b>Performance Expectations Assessment</b>	
How will you collect data to answer the following questions: What size shoe does a 3rd grader wear? How many books does a 3rd grader read?	Create a data based question and record the data you collected.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and interpret data.</b>		
<b>Performance Expectations</b>		
<b>3.DL.B.3</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.	<b>3.DL.B.4</b> Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	
<b>Performance Expectations Assessment</b>		



Draw a bar graph in which each square in the bar graph might represent 5 pets. Analyze how many more and less there are.	Mark the data on a line plot: $\frac{1}{2}$ , 2, $2\frac{1}{2}$ , 3, 3, $3\frac{1}{4}$ , $3\frac{1}{2}$
<b>Standards for Mathematical Practice: MP4- Model with mathematics; MP7- Look for and make use of structure.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE THREE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 3</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Reason with shapes and their attributes.</b>		
<b>Performance Expectations</b>		
<b>3.G.A.1</b> 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.	<b>3.G.A.2</b> 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 $\frac{1}{4}$ of the area of the shape.	
<b>Performance Expectations Assessment</b>		
Give 3 similarities and 3 differences that the following shapes have: square, rectangle, and rhombus. Share your thoughts with a partner.	Cut out a rectangle on grid paper. Draw lines to cut the shape so each part has an equal area. What fraction does one part of the shape represent?	
<b>Standards for Mathematical Practice: MP3- Construct viable arguments and critique the reasoning of others.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

# **Mathematics Curriculum**

## **Grade Four**

## Structure

### Disciplinary Concepts

- Solve problems using the four operations
- Fluently multiply and divide from 0 to 12
- Factors and multiples
- Analyze patterns
- Place value for multi-digit whole numbers
- Use place value to help solve multi-digit arithmetic
- Fraction equivalence and ordering
- Build fractions
- Relate and compare decimal to fractions
- Convert forms of measurement
- Data analysis
- Angle measurement and descriptions
- Lines, angles, and shapes

### Enduring Understanding

Students will understand that...

- Problems can consist of more than one operation.
- Factors and multiples will assist in more complex math concepts.
- Patterns are used continuously in math.
- Place value can make working with multi-digit numbers more clear.
- Fractions have many equivalents.
- Fractions can be represented as decimals and both can be compared.
- Measurements can be converted from larger units to smaller units and vice versa.
- Data can be interpreted and represented in a variety of ways.
- Angles have different names and can be measured.
- Lines and angles assist in classifying shapes.

- Calculations are used in daily life.
- Problem solving skills include perseverance and logical thinking.
- Modeling helps to solve problems.

### Essential Questions

- What are ways word problems can be solved?
- What is the difference between factors and multiples?
- How is a rule for a pattern determined?
- How does place value assist in rounding multi-digit numbers?
- How do you compare two multi-digit numbers using place value?
- What strategies can help add, subtract, multiply, or divide multi-digit whole numbers?
- What are equivalent fractions?
- What are ways a fraction can be represented?
- What are the steps in adding or subtracting fractions?
- What are the steps in multiplying a fraction by a whole number?
- How is a fraction represented as a decimal?
- How are fractions and decimals compared?
- How can measurements be converted?
- How can area and perimeter be calculated?
- How can a line plot help analyze fractions?
- How is an angle measured?
- What are the steps to draw the different types of lines and angles?
- How can shapes be classified by their lines and angles?
- What is a line of symmetry?
- Can you live as an adult without the ability to add, subtract, multiply, and divide?
- Do problem solving skills help in other curricular areas?
- Do models help in real life situations?

## Grade 4 Overview

Domain	Cluster Headings
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"><li>• Use the four operations with whole numbers to solve problems.</li><li>• Gain familiarity with factors and multiples.</li><li>• Generate and analyze patterns.</li></ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"><li>• Generalize place value understanding for multi-digit whole numbers.</li><li>• Use place value understanding and properties of operations to perform multi-digit arithmetic.</li></ul>
<b>Number and Operations - Fractions</b>	<ul style="list-style-type: none"><li>• Extend understanding of fraction equivalence and ordering.</li><li>• Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</li><li>• Understand decimal notation for fractions and compare decimal fractions.</li></ul>
<b>Measurement</b>	<ul style="list-style-type: none"><li>• Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</li><li>• Geometric measurement: understand concepts of angle and measure angles.</li></ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"><li>• Organize data and understand data visualizations.</li><li>• Represent and interpret data.</li></ul>
<b>Geometry</b>	<ul style="list-style-type: none"><li>• Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</li></ul>

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Operations and Algebraic Thinking</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Use the four operations with whole numbers to solve problems.</b></p>		
<b>Performance Expectations</b>		
<p><b>4.OA.A.1</b> Interpret a multiplication equation as a comparison, e.g., interpret <math>35 = 5 \times 7</math> as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</p>	<p><b>4.OA.A.2</b> 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.</p>	<p><b>4.OA.A.3</b> 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.</p>
<b>Performance Expectations Assessment</b>		
<p>Write an equation to represent the following: 6 times as many as 4 is 24.</p>	<p>Helen raised \$12 for the food bank last year and she raised 6 times as much money this year. How much money did she raise this year?</p> <p>Sandra raised \$15 for the PTA and Nita raised \$45. How many times as much money did Nita raise as compared to Sandra?</p>	<p>Karl's rectangular vegetable garden is 20 feet by 45 feet, and Makenna's is 25 feet by 40 feet. Whose garden is larger in area?</p> <p>Allow students to create their own problem, share, and critique one another.</p>
<p><b>Standards for Mathematical Practice: MP1- Make senses of problems and persevere in solving them.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b></p>		
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>		

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Gain familiarity with factors and multiples.</b>		
<b>Performance Expectations</b>		
<b>4.OA.B.4</b> Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.		
<b>Performance Expectations Assessment</b>		
What are the factors for the number 16? Is 16 prime or composite? Is 36 a multiple of 6? Is 36 prime or composite?		
<b>Standards for Mathematical Practice: MP2- Reason abstractly and quantitatively; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Generate and analyze patterns.</b>		
<b>Performance Expectations</b>		

**4.OA.C.5**

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.*

**Performance Expectations Assessment**

Generate a number pattern that follows the rule “add 5.” What do you notice about the pattern? Discuss with a partner.

**Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Number and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Generalize place value understanding for multi-digit whole numbers.</b>		
<b>Performance Expectations</b>		



<p><b>4.NBT.A.1</b> Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. <i>For example, recognize that <math>700 \div 70 = 10</math> by applying concepts of place value and division.</i></p>	<p><b>4.NBT.A.2</b> Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p>	<p><b>4.NBT.A.3</b> Use place value understanding to round multi-digit whole numbers to any place.</p>
<b>Performance Expectations Assessment</b>		
<p>Using place value, what is: <math>600 \div 6 = \underline{\quad}</math> <math>500 \div 50 = \underline{\quad}</math> Explain how you solved these problems using your understanding of place value.</p>	<p>Arrange these numbers in order, beginning with the greatest. 1470, 847, 710, 1047, 147</p> <p>Describe which is greater and how you know: 546 and 5460</p>	<p>Round 3,466 to the tens place. Round 3,466 to the hundreds place.</p>
<p><b>Standards for Mathematical Practice: MP2- Reason abstractly and quantitatively; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b></p>		
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>		

## GRADE FOUR CURRICULUM

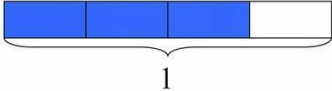
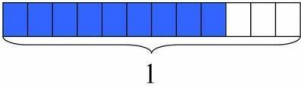
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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Number and Operations in Base Ten</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard: Use place value understanding and properties of operations to perform multi-digit arithmetic.</b></p>		
<b>Performance Expectations</b>		

<b>4.NBT.B.4</b> With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.	<b>4.NBT.B.5</b> 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.	<b>4.NBT.B.6</b> 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.
<b>Performance Expectations Assessment</b>		
Provide timed tests of addition and subtraction of multi-digit whole numbers.	Complete the following in 5 seconds: 324 x 4 1243 x 2 23 x 13 35 x 11	Complete the following: 214 ÷ 2 3124 ÷ 4 4315 ÷ 5
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

## GRADE FOUR CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Number and Operations- Fractions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Extend understanding of fraction equivalence and ordering.</b>		
<b>Performance Expectations</b>		
<b>4.NFA.1</b> 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.	<b>4.NFA.2</b> Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual fraction model.	
<b>Performance Expectations Assessment</b>		

<p>The rectangle below has length 1. What fraction does the shaded part represent?</p>  <p>The rectangle below has the same length. What fraction does the shaded part represent?</p>  <p>Use the pictures to explain why the two fractions represented above are equivalent.</p>	<p>How can you compare <math>\frac{29}{60}</math> and <math>\frac{45}{88}</math>? Compare them to a benchmark fraction.</p> <p>Compare <math>\frac{1}{5}</math> and <math>\frac{11}{40}</math> using <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>. Explain your reasoning.</p>
<p><b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP4- Model with mathematics; MP6- Attend to precision.</b></p>	
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>	

## GRADE FOUR CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 4</b>	<b>Domain: Number and Operations- Fractions</b>	
<p><b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>				
<p><b>Standard: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</b></p>				
<b>Performance Expectations</b>				
<p><b>4.NF.B.3a</b> Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>. <b>a.</b> Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</p>	<p><b>4.NF.B.3b</b> Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>. <b>b.</b> Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. <i>Examples:</i> <math>\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}</math>; <math>\frac{3}{8} = \frac{1}{8} + \frac{2}{8}</math>; <math>2 \frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}</math>.</p>	<p><b>4.NF.B.3c</b> Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>. <b>c.</b> Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.</p>	<p><b>4.NF.B.3d</b> Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>. <b>d.</b> Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.</p>	
<b>Performance Expectations Assessment</b>				

$\frac{1}{2} + \frac{1}{2} = ?$ Use a picture to explain how to find the answer.	Write $\frac{14}{7}$ as a sum of fractions in two different ways.	Complete the following: $4\frac{1}{2} + 3\frac{1}{2} = ?$ $5\frac{7}{8} - 2\frac{5}{8} = ?$ $2\frac{1}{3} + 2\frac{2}{3} = ?$	Susie bought $3\frac{2}{5}$ yards of rope and she used $1\frac{1}{5}$ yards. How much did she have left? Create a word problem involving adding or subtracting mixed numbers with like denominators.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP7- Look for and make use of structure.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

## GRADE FOUR CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Number and Operations- Fractions</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</b>			
<b>Performance Expectations</b>			
<b>4.NF.B.4a</b> Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. <b>a.</b> Understand a fraction $a/b$ as a multiple of $1/b$ . <i>For example, use a visual fraction model to represent <math>5/4</math> as the product <math>5 \times (1/4)</math>.</i>	<b>4.NF.B.4b</b> Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. <b>b.</b> Understand a multiple of $a/b$ as a multiple of $1/b$ , and use this understanding to multiply a fraction by a whole number. <i>For example, use a visual fraction model to express <math>3 \times (2/5)</math> as <math>6 \times (1/5)</math>, recognizing this product as <math>6/5</math>. (In general, <math>n \times (a/b) = (n \times a)/b</math>.)</i>	<b>4.NF.B.4c</b> Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. <b>c.</b> Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.	
<b>Performance Expectations Assessment</b>			
$7/3$ is $7 \times \underline{\hspace{1cm}}$ $4 \times \frac{1}{4} = \underline{\hspace{1cm}}$ Explain step by step how to solve these problems.	$4 \times \frac{3}{5} = ?$ $2 \times \frac{3}{4} = ?$ Explain step by step how to solve these problems.	If each person at a party will eat $\frac{3}{8}$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?	

**Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP7- Look for and make use of structure; MP8- Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

## GRADE FOUR CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Number and Operations- Fractions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand decimal notation for fractions, and compare decimal fractions.</b>		
<b>Performance Expectations</b>		
<b>4.NF.C.5</b> 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. <i>For example, express <math>3/10</math> as <math>30/100</math>, and add <math>3/10 + 4/100 = 34/100</math>.</i>	<b>4.NF.C.6</b> Use decimal notation for fractions with denominators 10 or 100.	<b>4.NF.C.7</b> Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual model.
<b>Performance Expectations Assessment</b>		
Use equivalent fractions to help solve the following. $9/10 + 8/100 = ?$ $23/100 + 7/10 = ?$	Write the decimal form of $62/100$ . What could the decimal represent? Draw a number line and locate the decimal.  What would $3/10$ be as a decimal?	Compare the fractions and decimals using $>$ , $=$ , or $<$ . $.42$ and $32/100$ $3/10$ and $.3$ $4/100$ and $.06$
<b>Standards for Mathematical Practice: MP2- Reason abstractly and quantitatively; MP6- Attend to precision; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FOUR CURRICULUM

<b>Content Area: Mathematics</b>			<b>Grade Level: 4</b>			<b>Domain: Measurement</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.								
<b>Standard: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</b>								
<b>Performance Expectations</b>								
<b>4.M.A.1</b> Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. <i>For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...</i>			<b>4.M.A.2</b> Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.			<b>4.M.A.3</b> Apply the area and perimeter formulas for rectangles in real world and mathematical problems. <i>For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor</i>		
<b>Performance Expectations Assessment</b>								
Meat weighs 2 lbs, how many ounces does the meat weigh? How many meters are in a kilometer?			John had 4.3 liters of soda for a party. His friends drink 1.4 liters before everyone gets to the party, how much soda is left for everyone? Sam fills a bird feeder with $3\frac{3}{4}$ cups of seed, but it is not enough. The bird feeder can hold 6 cups. How much more does Sam need to fill the feeder?			The area of a playroom is 75 feet and the length of the room is 25 feet, what is the width? Draw the room to help you.		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>								
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.								

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Geometric measurement: understand concepts of angle and measure angles</b>		
<b>Performance Expectations</b>		
<b>4.M.B.4</b>		
Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:		
a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through <sup>th</sup> of a circle is called a “one-degree angle,” and can be used to measure angles.		
b. An angle that turns through one-degree angles is said to have an angle measure of degrees.		
<b>Performance Expectations Assessment</b>		
If an angle turns 25 degrees, what would its angle measure be?		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP3MP4- Model with mathematics.; MP6- Attend to precision.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Measurement</b>
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<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.
<b>Standard: Geometric measurement: understand concepts of angle and measure angles</b>
<b>Performance Expectations</b>
<b>4.M.B.5</b> Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
<b>Performance Expectations Assessment</b>
Draw a 45 degree angle using a protractor.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP3MP4- Model with mathematics.; MP6- Attend to precision.</b>
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

## GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Geometric measurement: understand concepts of angle and measure angles</b>		
<b>Performance Expectations</b>		
<b>4.M.B.6</b> Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.		
<b>Performance Expectations Assessment</b>		



If two angles equal 90 degrees and one is 50 degrees, what will the measurement of the second angle be?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP3MP4- Model with mathematics.; MP6- Attend to precision.</b>
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Data Literacy</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Organize data and understand data visualizations</b>			
<b>Performance Expectations</b>			
<b>4.DL. A.1</b> Create data-based questions, generate ideas based on the questions, and then refine the questions.	<b>4.DL. A.2</b> Develop strategies to collect various types of data and organize data digitally.	<b>4.DL. A.3</b> Understand that subsets of data can be selected and analyzed for a particular purpose.	<b>4.DL. A.4</b> Analyze visualizations of a single data set, share explanations and draw conclusions that the data supports.
<b>Performance Expectations Assessment</b>			
Create sample data based questions that you can collect data for.	How can you collect data accurately?	What type of data might you collect to find the most popular vacation spot?	A graph shows that 10 out of 50 students prefer Math as their favorite subject. What conclusion supports the graph?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP3MP4- Model with mathematics.; MP6- Attend to precision.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard:</b> Represent and interpret measurement data		
<b>Performance Expectations</b>		
<b>4.DL.B.65</b> Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{8}$ ). Solve problems involving addition and subtraction of fractions by using information presented in line plots.		
<b>Performance Expectations Assessment</b>		
From a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP3MP4- Model with mathematics.; MP6- Attend to precision.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FOUR CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 4</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</b>		
<b>Performance Expectations</b>		

<p><b>4.G.A.1</b> Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.</p>	<p><b>4.G.A.2</b> 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. Recognize right triangles as a category, and identify right triangles.</p>	<p><b>4.G.A.3</b> Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</p>
<p><b>Performance Expectations Assessment</b></p>		
<p>Create a poster explaining the definition of point, lines, line segments, rays, acute angle, obtuse angle, right angle, perpendicular lines, and parallel lines. All figures must be labeled correctly with a definition.</p>	<p>Draw two shapes that both have one set of perpendicular lines.</p> <p>Draw two shapes with two sets of parallel lines and label the right angles if any are formed.</p>	<p>Draw a star and find the lines of symmetry. How many are there?</p> <p>Create your own shape and see how many lines of symmetry you can find.</p>
<p><b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b></p>		
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>		

# **Mathematics Curriculum**

## **Grade Five**

## Structure

### Disciplinary Concepts

- Numerical expressions
- Analyze patterns using rules
- Place value system and patterns
- Compare decimals
- Multiply and divide multi-digit whole numbers and decimals
- Equivalent fractions
- Add and subtract fractions with like and unlike denominators
- Multiply and divide fractions
- Convert like measurements
- Interpret data
- Volume and solid figures
- Graph on a coordinate plane
- Classify two dimensional figures

### Enduring Understanding

Students will understand that...

- Writing numerical expressions assists in recording calculations with numbers.
- Patterns can be analyzed by using rules to explain the relationship.
- Place value can make working with multi-digit numbers more clear.
- Decimals can be compared using place value.
- Utilizing algorithms can assist in multiplying and dividing multi-digit numbers.
- Strategies using place value can assist with adding, subtracting, multiplying, and dividing decimals.
- Finding equivalent fractions is a strategy to assist when adding and subtracting fractions.
- Adding, subtracting, multiplying, and dividing fractions are consistently used in real world problems.

- Measurements can be converted from larger to smaller units and vice versa.
- Line plots can represent a set of data.
- Volume is an attribute of a solid figure and can be measured with a formula.
- Graphing on a coordinate plane can assist in solving real world and mathematical problems.
- Two- dimensional figures can be grouped based on their common attributes.
- Place value is needed to use the four operations.
- People use fractions to measure many objects.
- Precision is necessary when calculating.
- Without volume, stores could not sell items fairly.
- Patterns can be seen in numbers, shapes, expressions, and the real world.

### Essential Questions

- What do parentheses represent in a numerical expression?
- How can patterns be analyzed?
- How does each place in the place value system relate to the place on the left and right?
- How can numbers be multiplied or divided by a power of ten?
- How can decimals be represented?
- How can decimals be compared?
- How are decimals rounded?
- What are the steps to multiplying multi-digit numbers?
- What are the steps to dividing with two digit divisors?
- How are operations performed with decimals?
- What are equivalent fractions?
- How are fractions added and subtracted?
- How are fractions multiplied?
- How are fractions divided?
- In a given measurement system, how can units be converted?
- How is data represented in line plots?
- What is volume?
- How is volume measured?
- How are points represented on a coordinate plane?
- How can two dimensional figures be classified?
- Why is place value necessary?
- Where do fractions occur in real life?

- Why is it important to manipulate numbers within the set of rational numbers?
- Why do societies need to measure volume and why is it important?
- How can patterns occur in math?

### Grade 5 Overview

Domain	Cluster Headings
<b>Operations and Algebraic Thinking</b>	<ul style="list-style-type: none"> <li>• Write and interpret numerical expressions.</li> <li>• Analyze patterns and relationships.</li> </ul>
<b>Number and Operations in Base Ten</b>	<ul style="list-style-type: none"> <li>• Understand the place value system.</li> <li>• Perform operations with multi-digit whole numbers and with decimals to hundredths.</li> </ul>
<b>Number and Operations - Fractions</b>	<ul style="list-style-type: none"> <li>• Use equivalent fractions as a strategy to add and subtract fractions.</li> <li>• Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• Convert like measurement units within a given measurement system.</li> <li>• Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.</li> </ul>
<b>Data Literacy</b>	<ul style="list-style-type: none"> <li>• Understand and analyze data visualizations.</li> <li>• Represent and interpret data.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>• Graph points on the coordinate plane to solve real-world and mathematical problems.</li> <li>• Classify two-dimensional figures into categories based on their properties.</li> </ul>

<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Write and interpret numerical expressions.</b>		
<b>Performance Expectations</b>		
<b>5.OA.A.1</b> Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	<b>5.OA.A.2</b> Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</i>	
<b>Performance Expectations Assessment</b>		
Evaluate the following numerical expressions: $2(5+(3)(2)+4)$  $2((5+3)(2+4))$  $2(5+3(2+4))$  If the parentheses are removed, will you get a different answer? Why?	Complete the expression to make the following true:  Add 2 and 4 and multiply the sum by 3. Next, add 5 to that product and then double the result.	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		



GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Operations and Algebraic Thinking</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Analyze patterns and relationships.</b>		
<b>Performance Expectations</b>		
<b>5.OA.B.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.		
<b>Performance Expectations Assessment</b>		
Given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences. What do you notice about the resulting sequences? Graph the pattern on a coordinate plane.		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP4- Model with mathematics; MP6- Attend to precision; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Number and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand the place value system.</b>		
<b>Performance Expectations</b>		

<b>5.NBT.A.1</b> Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	<b>5.NBT.A.2</b> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	<b>5.NBT.A.3a</b> Read, write, and compare decimals to thousandths. <b>a.</b> Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$ .	<b>5.NBT.A.3b</b> Read, write, and compare decimals to thousandths. <b>b.</b> Compare two decimals to thousandths based on meanings of the digits in each place, using $>$ , $=$ , and $<$ symbols to record the results of comparisons.	<b>5.NBT.A.4</b> Use place value understanding to round decimals to any place.
<b>Performance Expectations Assessment</b>				
A number in the hundreds place is how much larger than a number in the tens place? Explain the place value system and how the places relate to one another.	$23 \times 100 = ?$ $45.6 \div 10 = ?$ $10.7 \times 10^3 = ?$ $.036 \times 10^4 = ?$ $550.67 \div 10^2 = ?$	Correctly name the following and write them in expanded form: 1.21 .02 23.7 145.567 86.231	Compare the following decimals using $>$ , $=$ , and $<$ : $0.45 \underline{\quad} 0.35$ $1.412 \underline{\quad} 1.402$ $3.06 \underline{\quad} 3.064$ $23.032 \underline{\quad} 23.320$	Round 45.657 to the nearest ones, tenths, and thousandths place.
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>				
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Number and Operations in Base Ten</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Perform operations with multi-digit whole numbers and with decimals to hundredths.</b>		
<b>Performance Expectations</b>		

<b>5.NBT.B.5</b> With accuracy and efficiency, multiply multi-digit whole numbers using the standard algorithm.	<b>5.NBT.B.6</b> Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.	<b>5.NBT.B.7</b> Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
<b>Performance Expectations Assessment</b>		
Solve the following: 121 x 4 = ? 23 x 45 = ? 246 x 24 = ?	Solve the following: 2135 ÷ 45 = ? 1260 ÷ 20 = ? 456 ÷ 18 = ?	Use place value strategies, concrete models, or drawings to help solve the following problems. 1.23 + 0.45 = ? 45.23 - 5.622 = ? 2.546 x 0.3 = ? 98.25 ÷ 0.15 = ?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FIVE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Number and Operations- Fractions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use equivalent fractions as a strategy to add and subtract fractions.</b>		
<b>Performance Expectations</b>		
<b>5.NF.A.1</b> Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. <i>For example, <math>2/3 + 5/4 = 8/12 + 15/12 = 23/12</math>. (In general, <math>a/b + c/d = (ad + bc)/bd</math>.)</i>	<b>5.NF.A.2</b> Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <i>For example, recognize an incorrect result <math>2/5 + 1/2 = 3/7</math>, by observing that <math>3/7 &lt; 1/2</math>.</i>	

**Performance Expectations Assessment**

Complete the following finding equivalent fractions: $2/5 + 2/7 = ?$ $1\ 2/3 + 2\ 1/2 = ?$ $5/8 - 1/3 = ?$ $5\ 4/9 - 2\ 3/18 = ?$	A farmer planted $2/5$ of his forty acres in corn and another $3/10$ of his land in wheat. Taken together, what fraction of the 40 acres had been planted in corn or wheat? What benchmark fraction could be used to estimate the fraction $2/5$ ? $7/8$ ? $12/18$ ?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively. MP4- Model with mathematics; MP6- Attend to precision.; MP8- Look for and express regularity in repeated reasoning.</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

GRADE FIVE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Number and Operations- Fractions</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.				
<b>Standard: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</b>				
<b>Performance Expectations</b>				
<b>5.NF.B.3</b> Interpret a fraction as division of the numerator by the denominator (i.e, $a/b = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. <i>For example, interpret <math>3/4</math> as the result of</i>	<b>5.NF.B.4a</b> Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.  <b>a.</b> Interpret the product $(a/b) \times q$ as $a$ parts of a partition of $q$ into $b$ equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$ . <i>For</i>	<b>5.NF.B.4b</b> Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.  <b>b.</b> Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the	<b>5.NF.B.5a</b> Interpret multiplication as scaling (resizing), by:  <b>a.</b> Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	<b>5.NF.B.5b</b> Interpret multiplication as scaling (resizing), by:  <b>b.</b> Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction

<i>dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4.</i>	<i>example, use a visual fraction model to show <math>(2/3) \times 4 = 8/3</math>, and create a story context for this equation. (In general, <math>(a/b) \times (c/d) = ac/bd</math>.)</i>	same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.		equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying $a/b$ by 1.
<b>Performance Expectations Assessment</b>				
If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?	Draw a diagram to represent $2/3$ of 3.  Create another story using multiplication with a fraction and a whole number. Share with a partner, solve, and critique the problem.	A rectangle has a length equal to $3/4$ inch and the width is equal to $2/3$ inch. Find the area of the rectangle by tiling the rectangle and explain the pattern.	Decide which is greater without multiplying.  817 or $235 \times 817$  99 or $1/4 \times 99$  $51/100$ or $51/100 \times 301$  $13/90$ or $2/3 \times 13/90$	When multiplying a fraction by a number greater than one, will the product be greater or less than the original number? When multiplying a fraction by a number less than one, will the product be greater or less than the original number?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>				
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

<b>Content Area: Mathematics</b>		<b>Grade Level: 5</b>		<b>Domain: Number and Operation- Fractions</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</b>					
<b>Performance Expectations</b>					
<b>5.NF.B.6</b> Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	<b>5.NF.B.7a</b> Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.  <b>a.</b> Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for <math>(1/3) \div 4</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>(1/3) \div 4 = 1/12</math> because <math>(1/12) \times 4 = 1/3</math>.</i>		<b>5.NF.B.7b</b> Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.  <b>b.</b> Interpret division of a whole number by a unit fraction, and compute such quotients. <i>For example, create a story context for <math>4 \div (1/5)</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>4 \div (1/5) = 20</math> because <math>20 \times (1/5) = 4</math>.</i>		<b>5.NF.B.7c</b> Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.  <b>c.</b> Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?</i>
<b>Performance Expectations Assessment</b>					
Kendra is making $\frac{1}{2}$ of a recipe. The full recipe calls for $3\frac{1}{4}$ cup of flour. How many cups of flour should Kendra use? Use a picture and then an equation to show how to solve the problem.	Write the equation you are trying to solve and use a picture to help you.  There is $\frac{1}{4}$ of a cake left over and 3 boys want to share the cake. What fraction will each boy eat?		Write the equation you are trying to solve and use a picture to help you.  Shauna buys a three-foot-long sandwich for a party. She then cuts the sandwich into pieces, with each piece being $\frac{1}{2}$ foot long. How many pieces does she get?		How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally?  How many 1/3-cup servings are in 2 cups of raisins?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>					
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Convert like measurement units within a given measurement system.</b>		
<b>Performance Expectations</b>		
<b>5.M.A.1</b> Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.		
<b>Performance Expectations Assessment</b>		
Mrs. Smith had 75 feet of ribbon. If each of the 18 students in her class gets an equal length of ribbon, how long will each piece be? Write your answer		
<ul style="list-style-type: none"> <li>● Using only feet,</li> <li>● Using a whole number of feet and a whole number of inches, and</li> <li>● Using only inches.</li> </ul>		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Measurement</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and interpret data.</b>		
<b>Performance Expectations</b>		

<p><b>5.M.B.2</b> Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <p>a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.</p> <p>b. A solid figure which can be packed without gaps or overlaps using <math>n</math> unit cubes is said to have a volume of <math>n</math> cubic units.</p>	<p><b>5.M.B.3</b> Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.</p>	<p><b>5.M.B.4</b> Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.</p> <p>a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.</p> <p>b. Apply the formulas and for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.</p> <p>c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.</p>
<b>Performance Expectations Assessment</b>		
<p>What do you use to measure volume? If a container holds 24 unit cubes, what is the volume?</p>	<p>There are 3 cubic inches in length, 4 cubic inches in width, and 2 cubic inches in height. Use unit cubes to help find the volume of the three dimensional figure.</p>	<p>James wants to fill a section of his garden with soil. One section of the garden is 12 feet by 13 feet by 2 feet and the other has a base area of 56 feet and a height of 2 feet. How many cubic feet of soil does James need to fill both sections of the garden?</p>
<p><b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b></p>		
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>		

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GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Data Literacy</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		



<b>Standard: Understand and analyze data visualizations</b>			
<b>Performance Expectations</b>			
<b>5.DLA.1</b> Understand how different visualizations can highlight different aspects of data. Ask questions and interpret data visualizations to describe and analyze patterns.	<b>5.DLA.2</b> Develop strategies to collect, organize and represent data of various types and from various sources. Communicate results digitally through a data visual (e.g. chart, storyboard, video presentation).	<b>5.DLA.3</b> Collect and clean data to be analyzable (e.g., make sure each entry is formatted correctly, deal with missing or incomplete data).	<b>5.DLA.4</b> Using appropriate visualizations (i.e. double line plot, double bar graph), analyze data across samples.
<b>Performance Expectations Assessment</b>			
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

GRADE FIVE CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Data Literacy</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and interpret data</b>		
<b>Performance Expectations</b>		
<b>5.DL.B.5</b> Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots.		
<b>Performance Expectations Assessment</b>		

Given different measurements of liquid in identical beakers ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ), find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

**Standards for Mathematical Practice:** MP1- Make sense of problems and persevere in solving them.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE FIVE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Graph points on the coordinate plane to solve real-world and mathematical problems.</b>		
<b>Performance Expectations</b>		
<b>5.G.A.1</b> Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., $x$ -axis and $x$ -coordinate, $y$ -axis and $y$ -coordinate).	<b>5.G.A.2</b> Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	
<b>Performance Expectations Assessment</b>		
Graph the $(x, y)$ coordinates on the coordinate plane. Describe their relationship. (2,5) (4, 10) (6, 15)	Find the point represented by (8, 9) and label it A. If you travel to the left 3 places and down 1 and name that point B, what ordered pair will represent point B on the coordinate plane?	

<b>Standards for Mathematical Practice:</b> MP1- Make sense of problems and persevere in solving them.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE FIVE CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 5</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Classify two-dimensional figures into categories based on their properties.</b>		
<b>Performance Expectations</b>		
<b>5.G.B.3</b> Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category. <i>For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</i>	<b>5.G.B.4</b> Classify two-dimensional figures in a hierarchy based on properties.	
<b>Performance Expectations Assessment</b>		
What attributes do squares have in common with rectangles? What attributes do squares have in common with parallelograms? What attributes do rectangles have in common with parallelograms? What attributes do squares have in common with rhombuses?	Classify square, rectangle, parallelogram, trapezoid, and rhombus based on: 1. length of sides 2. angles 3. number of parallel lines	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

# Mathematics Curriculum

## Grade Six



## Structure

### Disciplinary Concepts

- Ratios and rates
- Dividing fractions
- Add, subtract, multiply, and divide multi-digit decimals
- Common factors and multiples
- System of rational numbers
- Comparing rational numbers
- Graphing on a coordinate plane
- Algebraic expressions
- Solving equations and inequalities
- Quantitative relationships between dependent and independent variables
- Area, surface area, and volume
- Statistical questions and measures of variation
- Distribution of data

### Enduring Understanding

Students will understand that...

- Ratios and rates are used in mathematical problems and help solve real world problems.
- Fraction models and equations assist in understanding division of fractions with real world application.
- Numbers have a greatest common factor and a least common multiple, which can be found in different ways.
- Positive and negative numbers describe amounts with opposite values.
- Rational numbers are points on a number line.
- Rational numbers can be placed in order and compared.
- Graphing points on a coordinate plane can help find distances between points in the four quadrants.
- Expressions record operations with numbers and a variable.
- One variable equations and inequalities can be solved by getting the variable alone.
- Analyzing relationships between dependent and independent variables can be expressed through graphs and tables.

- Finding the area of triangles, quadrilaterals, and other polygons can be found by decomposing shapes into smaller ones.
- Volume is expressed in cubic units and can be found by using the formulas.
- Nets assist in finding the surface area of three dimensional figures.
- Statistical questions can be tested and provide variability.
- Data can be collected to answer a statistical question and the distribution can be represented through line plots, dot plots, histograms, and box plots.
- Shapes appear in real world scenarios and assist with daily living.
- Real world finances can be solved with ratios and proportions.
- Calculations are essential to daily living.
- Data and measurement can be analyzed to predict patterns.
- Numbers can be represented with variables for the unknown.

### Essential Questions

- What does a ratio represent?
- What is a rate?
- How is a fraction divided by a fraction?
- How are common factors and multiples determined?
- What are the steps to adding, subtracting, multiplying, and dividing decimals?
- How are positive and negative numbers used?
- What is a rational number?
- How are rational numbers compared?
- How are points graphed on a coordinate plane?
- How are algebraic expressions represented?
- What are the steps to solving one variable equations and inequalities?
- How can dependent and independent variables be analyzed and represented?
- What are the formulas for area?
- How is surface area determined?
- What are formulas for volume?
- What is statistical variability and how can it be displayed?
- How can numerical data be represented?
- What are ways distribution of data can be analyzed?
- Where do shapes appear in daily life?
- How do proportions translate to real world situations?
- Why is precision necessary?

- How do patterns help to predict future events?
- How can an equation represent a real life scenario?

## Grade 6 Overview

Domain	Cluster Headings
<b>Ratio and Proportional Relationships</b>	Understand ratio concepts and use ratio reasoning to solve problems.
<b>The Number System</b>	<ul style="list-style-type: none"> <li>• Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</li> <li>• Compute fluently with multi-digit numbers and find common factors and multiples.</li> <li>• Apply and extend previous understandings of numbers to the system of rational numbers.</li> </ul>
<b>Expressions and Equations</b>	<ul style="list-style-type: none"> <li>• Apply and extend previous understandings of arithmetic to algebraic expressions</li> <li>• Reason about and solve one-variable equations and inequalities</li> <li>• Represent and analyze quantitative relationships between dependent and independent variables</li> </ul>
<b>Geometry</b>	Solve real-world and mathematical problems involving area, surface area, and volume.
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>• Develop understanding of statistical variability</li> <li>• Summarize and describe distributions</li> </ul>



GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: Ratios and Proportional Relationships</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand ratio concepts and use ratio reasoning to solve problems.</b>		
<b>Performance Expectations</b>		
<b>6.R.P.A.1</b> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.</i>	<b>6.R.P.A.2</b> Understand the concept of a unit rate $a/b$ associated with a ratio $a:b$ with $b \neq 0$ , and use rate language in the context of a ratio relationship. <i>For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is <math>3/4</math> cup of flour for each cup of sugar.”</i>	
<b>Performance Expectations Assessment</b>		
Write the ratio that describes each relationship. For every 1 vote for candidate A, candidate B received 3 votes. There are 4 pizzas for a group of 10 students.	Julie paid \$75 for 15 hamburgers, what is the rate per hamburger? The student types 80 words in 3 minutes, what is the unit rate?	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: Ratios and Proportional Relationships</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand ratio concepts and use ratio reasoning to solve problems.</b>		
<b>Performance Expectations</b>		

<p><b>6.R.P.A.3a</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. <b>a.</b> Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</p>	<p><b>6.R.P.A.3b</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. <b>b.</b> Solve unit rate problems including those involving unit pricing and constant speed.</p>	<p><b>6.R.P.A.3c</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. <b>c.</b> Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.</p>	<p><b>6.R.P.A.3d</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. <b>d.</b> Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities</p>
<b>Performance Expectations Assessment</b>			
<p>Create a table of equal ratios using 1:3. Plot the points on a coordinate plane. What pattern do you notice?</p>	<p>If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</p>	<p>What is 20% of 80? 50 is 25% of what number? What is 50% of 280? 150 is 75% of what number?</p>	<p>Use ratios to find how many inches are in 5 yards.  Use ratios to find how many meters are in 4 kilometers.</p>
<p><b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b></p>			
<p><b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</p>			

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: The Number System</b>
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>		
<p><b>Standard:</b> Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</p>		
<b>Performance Expectations</b>		

**6.NS.A.1**  
 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for  $(2/3) \div (3/4)$  and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that  $(2/3) \div (3/4) = 8/9$  because  $3/4$  of  $8/9$  is  $2/3$ . (In general,  $(a/b) \div (c/d) = ad/bc$ .)*

**Performance Expectations Assessment**

Solve the problems and use models to help solve if needed.  
 How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally?  
 How many  $1/4$ -cup servings are in  $2/3$  of a cup of yogurt?  
 How wide is a rectangular strip of land with length  $3/4$  mi and area  $1/2$  square mi?

**Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

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GRADE SIX CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: The Number System</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Compute fluently with multi-digit numbers and find common factors and multiples.</b>		
<b>Performance Expectations</b>		
<b>6.NS.B.2</b> With accuracy and efficiency, divide multi-digit numbers using the standard algorithm.	<b>6.NS.B.3</b> With accuracy and efficiency add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	<b>6.NS.B.4</b> Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. <i>For example, express <math>36 + 8</math> as <math>4(9 + 2)</math>.</i>
<b>Performance Expectations Assessment</b>		

Divide the following: $2345 \div 20$ $648 \div 22$ $32,746 \div 35$ $46,218 \div 18$	Complete the following: $456.987 + 34.06$ $123.05 - 12.19$ $36.7 \times 0.13$ $23.56 \div 0.21$	Find the GCF for the following numbers: 32 and 18 26 and 13 50 and 100 Find the LCM for the following numbers: 3 and 8 5 and 12 9 and 12
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.</b>		

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>		<b>Domain: The Number System</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Apply and extend previous understandings of numbers to the system of rational numbers.</b>					
<b>Performance Expectations</b>					
<b>6.NS.C.5</b> Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	<b>6.NS.C.6a</b> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.  <b>a.</b> Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$ , and that 0 is its own opposite.	<b>6.NS.C.6b</b> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.  <b>b.</b> Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	<b>6.NS.C.6c</b> Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.  <b>c.</b> Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.		
<b>Performance Expectations Assessment</b>					

Write the positive or negative integer that represents the situation: 50 feet below sea level, temperature rose 7 degrees, withdrawal 25 dollars, and deposit 50 dollars	What is the opposite of 4? What is the opposite of -8? What is the opposite of 0?	Label the following points on a coordinate plane and describe their relationship: (-1, 2) and (1, -2) (-2, 3) and (2, 3)	Create a number line. Find and label the following rational numbers: -1, 0, $-\frac{1}{2}$ , 3, $\frac{3}{4}$ , $\frac{7}{8}$ , 1, and $-\frac{3}{4}$ .
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>		<b>Domain: The Number System</b>	
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Apply and extend previous understandings of numbers to the system of rational numbers.</b>					
<b>Performance Expectations</b>					
<b>6.NS.C.7a</b> Understand ordering and absolute value of rational numbers. <b>a.</b> Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>For example, interpret <math>-3 &gt; -7</math> as a statement that <math>-3</math> is located to the right of <math>-7</math> on a number line oriented from left to right.</i>	<b>6.NS.C.7b</b> Understand ordering and absolute value of rational numbers. <b>b.</b> Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write <math>-3^{\circ}\text{C} &gt; -7^{\circ}\text{C}</math> to express the fact that <math>-3^{\circ}\text{C}</math> is warmer than <math>-7^{\circ}\text{C}</math>.</i>	<b>6.NS.C.7c</b> Understand ordering and absolute value of rational numbers. <b>c.</b> Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. <i>For example, for an account balance of <math>-30</math> dollars, write <math> -30  = 30</math> to describe the size of the debt in dollars.</i>	<b>6.NS.C.7d</b> Understand ordering and absolute value of rational numbers. <b>d.</b> Distinguish comparisons of absolute value from statements about order. <i>For example, recognize that an account balance less than <math>-30</math> dollars represents a debt greater than 30 dollars.</i>	<b>6.NS.C.8</b> Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	
<b>Performance Expectations Assessment</b>					
Which number is greater, -3 or -8? Which one is further to the right on a number line?	Which is warmer, -4 degrees or -9 degrees?	What does absolute value describe? What is the absolute value of -45?	The temperature in Alaska dropped and was less than -25 degrees Fahrenheit.	What is the distance between (-5, 2) and (-9, 2)?	

	Who has more points if one person has -1 points and another has -7 points?	What is the absolute value of 10?	Was the drop in temperature greater than or less than 25 degrees?	What is the distance between $(3, -5 \frac{1}{2})$ and $(3, 2 \frac{1}{4})$ ?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>				
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>		<b>Domain: Expressions and Equations</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Apply and extend previous understandings of arithmetic to algebraic expressions.</b>					
<b>Performance Expectations</b>					
<b>6.EE.A.1</b> Write and evaluate numerical expressions involving whole-number exponents.	<b>6.EE.A.2a</b> Write, read, and evaluate expressions in which letters stand for numbers. <b>a.</b> Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation “Subtract y from 5” as <math>5 - y</math>.</i>	<b>6.EE.A.2b</b> Write, read, and evaluate expressions in which letters stand for numbers. <b>b.</b> Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. <i>For example, describe the expression <math>2(8 + 7)</math> as a product of two factors; view <math>(8 + 7)</math> as both a single entity and a sum of two terms.</i>	<b>6.EE.A.2c</b> Write, read, and evaluate expressions in which letters stand for numbers. <b>c.</b> Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).		
<b>Performance Expectations Assessment</b>					
The 6th grade class has three square garden boxes to create an outdoor community garden. The lengths of the sides of the three garden boxes are 12 feet, 15 feet, and 8 feet. Use exponents. What is the total	Some of the students at Kahlo Middle School like to ride their bikes to and from school. They always ride unless it rains.  Let $d$ be the distance in miles from a student’s home to the school. Write two different expressions that represent how	Describe the following expression using mathematical terms. $3(9-2) + 6x$  <u>25</u> $5 + 2(5 + 3)$	Use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$ . Discuss your solutions with a partner.		

area needed to create the outdoor community garden?	far a student travels by bike in a four week period if there is one rainy day each week.	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: Expressions and Equations</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Apply and extend previous understandings of arithmetic to algebraic expressions.</b>		
<b>Performance Expectations</b>		
<b>6.EE.A.3</b> Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property to the expression <math>3(2 + x)</math> to produce the equivalent expression <math>6 + 3x</math>; apply the distributive property to the expression <math>24x + 18y</math> to produce the equivalent expression <math>6(4x + 3y)</math>; apply properties of operations to <math>y + y + y</math> to produce the equivalent expression <math>3y</math>.</i>	<b>6.EE.A.4</b> Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). <i>For example, the expressions <math>y + y + y</math> and <math>3y</math> are equivalent because they name the same number regardless of which number <math>y</math> stands for.</i>	
<b>Performance Expectations Assessment</b>		
Use the distributive property to find an equivalent expression: $6(3x + 4)$ $y + y + y + x + x$ $32x + 24y$	Are the following expressions equivalent? $x + x$ and $2x + 2x$ $y + y + y + x$ and $3y + x$ $14x + 7y$ and $7(2x + y)$ $12x + 4y$ and $4(4x + y)$	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>		<b>Domain: Expressions and Equations</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Reason about and solve one-variable equations and inequalities.</b>					
<b>Performance Expectations</b>					
<b>6.EE.B.5</b> Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.		<b>6.EE.B.6</b> Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.		<b>6.EE.B.7</b> Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p, q$ and $x$ are all nonnegative rational numbers.	
<b>6.EE.B.8</b> Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.					
<b>Performance Expectations Assessment</b>					
Shipping is free for all orders \$24.99 and over at clothesfortrolls.com. What amounts can receive free shipping? Let “a” represent free shipping orders and write the inequality. Give 3 possible solutions.  The librarian is filling a bookshelf. It can hold 125 books and she has placed 47 books on the shelf already. How many books can she add to the shelf to fill it? Write the equation and find the solution.		A town’s total allocation for firefighter’s wages and benefits in a new budget is \$600,000. If wages are calculated at \$40,000 per firefighter and benefits at \$20,000 per firefighter, write an equation whose solution is the number of firefighters the town can employ if they spend their whole budget. Solve the equation.		Ogdensburg Elementary 6th graders made \$215 dollars on their school play. They made \$55.00 on popcorn sales. How much did they earn from ticket sales?  Ogdensburg Elementary 6th graders sold three times as many tickets to the school play this week as they did last week. They sold 60 tickets this week. How many tickets did they sell the week before?	
Fishing Adventures rents small fishing boats to tourists for day-long fishing trips. Each boat can hold at most eight people. Additionally, each boat can only carry 900 pounds of weight for safety reasons.  -Let p represent the total number of people. Write an inequality to describe the number of people that a boat can hold. Draw a number line diagram that shows all possible solutions. -Let w represent the total weight of a group of people wishing to rent a boat. Write an inequality that describes all total weights allowed in a boat. Draw a number line diagram that shows all possible solutions.					
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>					



**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE SIX CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: Expressions and Equations</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and analyze quantitative relationships between dependent and independent variables.</b>		
<b>Performance Expectations</b>		
<b>6.EE.C.9</b> Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation <math>d = 65t</math> to represent the relationship between distance and time.</i>		
<b>Performance Expectations Assessment</b>		
Stephanie is helping her band collect money to fund a field trip. The band decided to sell boxes of chocolate bars. Each bar sells for \$1.50 and each box contains 20 bars. Create a table of money collected for different numbers of boxes sold.  a. Write an equation for the amount of money, $m$ , that will be collected if $b$ boxes of chocolate bars are sold. Which is the independent variable and which is the dependent variable?  b. Graph the equation using the ordered pairs from the table.  c. Calculate how much money will be collected if 100 boxes of chocolate bars are sold.  d. The band collected \$1530.00 from chocolate bar sales. How many boxes did they sell?		
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>	<b>Domain: Geometry</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.				
<b>Standard: Solve real-world and mathematical problems involving area, surface area, and volume.</b>				
<b>Performance Expectations</b>				
<b>6.G.A.1</b> Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	<b>6.G.A.2</b> Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	<b>6.G.A.3</b> Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	<b>6.G.A.4</b> Represent three-dimensional figures (e.g., pyramid, triangular prism, rectangular prism) using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	
<b>Performance Expectations Assessment</b>				
What is the formula for finding area of the following: Triangle Square Rectangle  How can the area of a parallelogram, hexagon, or octagon be found by breaking the shape into smaller shapes?	Leo's recipe for banana bread won't fit in his favorite pan. The batter fills the 8.5 inch by 11 inch 1.75 inch pan to the very top, but when it bakes it spills over the side. He has another pan that is 9 inches by 9 inches by 3 inches, and from past experience he thinks he needs about an inch between the top of the batter and the rim of the pan. Should he use this pan? Discuss your answer with a partner.	On a map, the library is located at (-2, 2), the city hall building is located at (0,2), and the high school is located at (0,0). Represent the locations as points on a coordinate grid with a unit of 1 mile. - What is the distance from the library to the city hall building? The distance from the city hall building to the high school? How do you know? - What shape does connecting the three locations form?	Draw a net of a rectangular prism with a length of 6 inches, a width of 3 inches and height of 2 inches. Explain how to find the surface area using the dimensions and the net.	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP2- Reason abstractly and quantitatively.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>				

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 6</b>	<b>Domain: Statistics and Probability</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Develop understanding of statistical variability.</b>		
<b>Performance Expectations</b>		
<b>6.SPA.1</b> Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i>	<b>6.SPA.2</b> Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	<b>6.SPA.3</b> Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
<b>Performance Expectations Assessment</b>		
Determine if the following questions are statistical questions: What is my favorite color? How old am I? How many students are in each grade? Are apples red? What is the average amount of time students spend exercising each week? How old are the students in the school?	The scores for organization in an extended response question were 0, 1, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, and 6.  The scores for accuracy in an extended response question were 2, 2, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 6, 6, 6, and 6.  - Graph the data from the two charts on a line plot. What observations do you notice about the center, spread, and overall shape of the data?  When a large number is added to a distribution, does the mean or median change the most - and why?	The scores for organization in an extended response question were 0, 1, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, and 6.  - How many students are represented in the data set? - What are the mean, median, and mode of the data set? What do these values mean? How do they compare? - What is the range of the data? What does this value mean?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them; MP2- Reason abstractly and quantitatively.; MP4- Model with mathematics.; MP6- Attend to precision.; MP7- Look for and make use of structure.</b>		

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE SIX CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 6</b>	<b>Domain: Statistics and Probability</b>		
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Summarize and describe distributions.</b>					
<b>Performance Expectations</b>					
<b>6.SP.B.4</b> Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	<b>6.SP.B.5a</b> Summarize numerical data sets in relation to their context, such as by: <b>a.</b> Reporting the number of observations.	<b>6.SP.B.5b</b> Summarize numerical data sets in relation to their context, such as by: <b>b.</b> Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	<b>6.SP.B.5c</b> Summarize numerical data sets in relation to their context, such as by: <b>c.</b> Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	<b>6.SP.B.5d</b> Summarize numerical data sets in relation to their context, such as by: <b>d.</b> Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	
<b>Performance Expectations Assessment</b>					
Display the scores of the most recent math test in a dot plot, histogram, and a box plot. 68, 73, 75, 80, 84, 84, 84, 88, 90, 90, 91	Collect the number of pets each of the students in your class owns and summarize the data.	Explain how the unit of measure could change the way the data is collected and interpreted.  When collecting data on people's height and foot length, why would the units used be important?	Explain the similarities and differences of the interquartile range and mean absolute deviation.  How would two distributions compare to one another if they had the same mean but the variation for one was much smaller than the other? Discuss your ideas with a partner.	In a community of homes, most are very modest and similar. There are a few homes, however, that are very extravagant. What measure of center would be appropriate to describe the typical home value?	
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them.; MP3- Construct viable arguments and critique the reasoning of others.; MP4- Model with mathematics.; MP5- Use appropriate tools strategically.; MP6- Attend to precision.; MP7- Look for and make use of structure.; MP8- Look for and express regularity in repeated reasoning.</b>					

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

# Mathematics Curriculum

## Grade Seven



## Structure

### Disciplinary Concepts

- Develop an understanding of proportionality to solve multi-step problems
- Expand knowledge of percent problems to include percent of increase and percent of decrease
- Graph proportional relationships on the coordinate plane
- Perform four operations with the set of real numbers
- Create and solve expressions and equations to represent mathematical situations
- Use equations to solve perimeter, area, and volume
- Identify relationships of angles with parallel lines and transversals
- Use representative samples to draw inferences
- Represent real-life mathematical problems using expressions and equations
- Represent data in a variety of graphs
- Develop an understanding of probability

### Enduring Understanding

Students will understand that...

- Unit rates can assist in solving problems.
- Quantities can be represented with proportionality.
- Proportional relationships can be represented on a coordinate plane.
- Opposite quantities combine to make zero.
- Absolute value measures a distance.
- Properties of operations are strategies that assist with calculations.
- Variables represent unknown quantities in expressions and equations.
- Tools assist in construction of geometrical figures.
- Formulas for area, perimeter, and volume support the solution of real-world problems.
- Supplementary, complementary, vertical, and adjacent angles apply to geometric figures.
- Random sampling draws conclusions about populations.
- Probability expresses the likelihood of an event.
- Probabilities of compound events use organized lists, tables, tree diagrams, and simulation.

- Shapes appear in real world scenarios and assist with daily living.
- Real world finances can be solved with ratios and proportions.
- Calculations are essential to daily living.
- Data and measurement can be analyzed to predict patterns.
- Numbers can be represented with variables for the unknown.

## Essential Questions

- How do you calculate a unit rate?
- What is a proportion?
- How do you compare two ratios?
- What is an additive inverse?
- How is subtraction of integers related to addition?
- What is the process for performing the four operations on different formats of rational numbers?
- How does a fraction convert to a decimal?
- What are the steps for solving equations using variables?
- How are inequalities different from equalities?
- How do proportions assist in creating a scale drawing?
- What tools are used to draw geometric shapes?
- What is a plane section of a three-dimensional shape?
- What types of angles assist in analyzing angles with parallel lines and a transversal?
- How do statistics describe a population?
- How does a random sampling represent a population?
- What information is used to compare two populations?
- What does probability tell about an event?
- Between what two numbers does probability lie?
- What is a compound event when calculating probability?
- How do you calculate a compound event?
- Where do shapes appear in daily life?
- How do proportions translate to real world situations?
- Why is precision necessary?
- How do patterns help to predict future events?
- How can an equation represent a real life scenario?



## Grade 7 Overview

Domain	Cluster Headings
<b>Ratio and Proportional Relationships</b>	<ul style="list-style-type: none"><li>· Analyze proportional relationships and use them to solve real-world and mathematical problems.</li></ul>
<b>The Number System</b>	<ul style="list-style-type: none"><li>· Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</li></ul>
<b>Expressions and Equations</b>	<ul style="list-style-type: none"><li>· Use properties of operations to generate equivalent expressions.</li><li>· Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</li></ul>
<b>Geometry</b>	<ul style="list-style-type: none"><li>· Draw, construct and describe geometrical figures and describe the relationships between them.</li><li>· Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</li></ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"><li>· Use random sampling to draw inferences about a population.</li><li>· Draw informal comparative inferences about two populations.</li><li>· Investigate chance processes and develop, use, and evaluate probability models.</li></ul>

<b>Content Area: Mathematics</b>		<b>Grade Level: 7</b>		<b>Domain: Ratios and Proportional Relationships</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Analyze proportional relationships and use them to solve real-world and mathematical problems.</b>					
<b>Performance Expectations</b>					
<b>7.R.P.A.1</b> Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.	<b>7.R.P.A.2</b> Recognize and represent proportional relationships between quantities: <b>a.</b> decide whether two quantities are in a proportional relationship.	<b>7.R.P.A.2</b> Recognize and represent proportional relationships between quantities: <b>b.</b> identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	<b>7.R.P.A.2</b> Recognize and represent proportional relationships between quantities: <b>c.</b> represent proportional relationships by equations.	<b>7.R.P.A.2</b> Recognize and represent proportional relationships between quantities: <b>d.</b> explain what a point $(x, y)$ on a graph of a proportional relationship means in terms of the situation, with special attention to $(0, 0)$ and $(1, r)$ where $r$ is the unit rate.	
<b>Performance Expectations Assessment</b>					
If a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ mph (2 mph).	Given a table of values, are there equivalent ratios in the table? Are the quantities in the table on the same line of the coordinate plane?	Study the graph. What is the unit rate of change?	If the total cost $t$ is proportional to the number $n$ of items purchased at a constant price $p$ , what is the relationship between total cost and the number of items? ( $t = pn$ )	Look at the graph of two men’s salaries. Who makes more money after 5 hours?	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2- Reason abstractly and quantitatively. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>					
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level:</b>	<b>Domain: Ratios and Proportional Relationships</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Analyze proportional relationships and use them to solve real-world and mathematical problems.</b>		
<b>Performance Expectations</b>		
<b>7.RPA.3</b> Use proportional relationships to solve multistep ratio and percent problems.		
<b>Performance Expectations Assessment</b>		
Given a principal of \$5000, with a simple interest rate of 2.5% per month, how much interest do you make the first year? How much is in the account at the end of the third month? How much would be in the account after the third month of compounded interest?		
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: The Number System</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</b>		
<b>Performance Expectations</b>		

<b>7.NS.A.1</b> Apply and extend previous understandings of addition and subtraction with rational numbers; represent + and – on a horizontal or vertical number line. <b>a.</b> Describe situations in which opposite quantities combine to make zero.	<b>7.NS.A.1</b> Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers: represent + and – on a horizontal or vertical number line. <b>b.</b> Understand $p + q$ as the number located a distance from $p$ ( $ q $ ) in the positive or negative direction.	<b>7.NS.A.1</b> Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers: represent + and – on a horizontal or vertical number line. <b>c.</b> Represent proportional relationships by equations.	<b>7.NS.A.1</b> Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers: represent + and – on a horizontal or vertical number line. <b>d.</b> Apply properties of operations as strategies to add and subtract rational numbers.	<b>7.NS.A.2</b> Apply and extend previous understandings of multiplication and division and fractions to multiply and divide rational numbers: <b>a.</b> understand that properties of fractions extend to rational numbers (rules for signed numbers).
<b>Performance Expectations Assessment</b>				
A retailer sells 37 gumballs and replaces them with his next order of 45. Show the relationship on a number line.	Show the addition of $8 + -4$ on a number line. Which number needs to consider absolute value?	Given that you purchase $n$ items at a price $p$ . What is the equation for the total cost $t$ ?	Add $3.5 + 3\frac{1}{2} + -8.15$ using associative property.	If a store sells a ream for \$2.50 and averages selling $\frac{1}{2}$ a ream of paper every $\frac{1}{4}$ hour, how much money will they lose if they sell the paper for $\frac{1}{10}$ its cost for a week?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>				
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.				

GRADE SEVEN CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: The Number System</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</b>		
<b>Performance Expectations</b>		

<b>7.NS.A.2</b> Apply and extend previous understandings of multiplication and division and fractions to multiply and divide rational numbers: <b>b.</b> understand that integers can be divided (not by 0) and the quotient will be rational.	<b>7.NS.A.2</b> Apply and extend previous understandings of multiplication and division and fractions to multiply and divide rational numbers: <b>c.</b> apply properties of operations as strategies to multiply and divide rational numbers.	<b>7.NS.A.2</b> Apply and extend previous understandings of multiplication and division and fractions to multiply and divide rational numbers; Convert rational numbers to decimals using long division: <b>d.</b> understand the decimal (0 or repeating) of a rational number.	<b>7.NS.A.3</b> Solve real-world and mathematical problems involving the four operations with rational numbers.
<b>Performance Expectations Assessment</b>			
Explain what - 0.5 means on a stock market quote. How do you write 15 degrees below zero as an integer?	What are the rules for operations with integers? Explain the difference between: -(p/q) -p/q p/-q	Why is Pi an irrational number?	A student purchases $4^{1/3}$ meters of chain at \$ .34 per meter. How much did they pay?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>			
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.			

GRADE SEVEN CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Expressions and Equations</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use properties of operations to generate equivalent expressions.</b>		
<b>Performance Expectations</b>		
<b>7.EE.A.1</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	<b>7.EE.A.2</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.	
<b>Performance Expectations Assessment</b>		
Solve $2.3x + -7 = 39$	Explain why $a + 0.05a = 1.05a$ . Recognize that the .05 is a 5% increase.	

**Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP8 - Look for and express regularity in repeated reasoning.**

**Assessment** - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

GRADE SEVEN CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Expressions and Equations</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b>		
<b>Performance Expectations</b>		
<b>7.EE.B.3</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers while utilizing tools, properties of operations, and assess reasonableness of answer.	<b>7.EE.B.4</b> Use variable to represent quantities; <b>a .</b> Construct equations and inequalities to solve problems in the form $ax + c = y$ or $a(x + c) = y$ . Solve accurately and efficiently.	<b>7.EE.B.4</b> Use variable to represent quantities; <b>b .</b> Construct equations and inequalities to solve problems in the form $ax + c < (or >) y$ . Graph the solution set.
<b>Performance Expectations Assessment</b>		
If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour. What is her new salary? (\$2.50 + \$25). If you want to place a towel bar $9\frac{3}{4}$ in. long in the center of a door 2.5 ft. long, how far from each side will it be?	The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	As a salesperson, you are paid \$50 per week plus \$3 per sale. You want your pay to be <i>at least</i> \$100. Write an inequality for the number of sales that you need and describe the solution. Explain your answer.
<b>Standards for Mathematical Practice: MP1 Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Draw, construct, and describe geometrical figures and describe the relationship between them.</b>		
<b>Performance Expectations</b>		
<b>7.G.A.1</b> Solve problems involving scale drawings of geometric figures including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	<b>7.G.A.2</b> Draw geometric shapes with given conditions. Focus on constructing triangles from 3 measures of angles or sides. Notice when the conditions make a unique triangle, more than one triangle, or no triangle.	<b>7.G.A.3</b> Describe the two-dimensional figures that result from slicing three-dimensional figures (as in plane sections of right rectangular prism or right rectangular pyramids).
<b>Performance Expectations Assessment</b>		
Your model car is at 1:16 scale. The model car is 12 inches long. How long would it be if the scale was 1:20?	Explain the steps to use a ruler and protractor to circumscribe a circle around a triangle.	What shape would result when you cut a right rectangular pyramid from the point to the base?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP4 - Model with Mathematics. MP5 Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure.</b>		
<b>Assessment -</b> Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</b>		
<b>Performance Expectations</b>		

<b>7.G.B.4</b> Know the formulas for a circle (area & circumference) and use them to solve problems; give an informal derivation of the relationship of circumference and area of circles.	<b>7.G.B.5</b> Use facts about supplementary, complimentary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	<b>7.G.B.6</b> Solve real-world and mathematical problems with area, volume, and surface area of 2 and 3 dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
<b>Performance Expectations Assessment</b>		
Explain from where the number Pi comes.	Given a diagram and one angle measurement, find the remaining angles.	A yard has an equilateral pentagonal pool. Each side measures 5 ft. The water will be 6 ft. deep. What is the volume of water in the pool?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Statistics and Probability</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use random sampling to draw inferences about a population.</b>		
<b>Performance Expectations</b>		
<b>7.SPA.1</b> Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	<b>7.SPA.2</b> Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generalize multiple samples of the same size to gauge the variation in estimates or predictions.	
<b>Performance Expectations Assessment</b>		



Create a survey and, after collating the information draw conclusions about the population.	Estimate the mean word length in a book by randomly sampling words from the book. Predict the winner of a school election based on random sampling.
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP5 - Use appropriate tools strategically. MP6 - Attend to precision</b>	
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.	

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GRADE SEVEN CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Statistics and Probability</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Draw informal comparative inferences about two populations.</b>		
<b>Performance Expectations</b>		
<b>7.SP.B.3</b> Informally assess the degree of visual overlap of two numerical data distributions with similar variability; measure the difference between the centers and express it visually.	<b>7.SP.B.4</b> Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	
<b>Performance Expectations Assessment</b>		
The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team. Show on a dot plot the separation between the two distributions of heights is noticeable.	Decide whether the words in chapter 6 of your science book are generally longer than the words in ch. 6 of your fifth grade science book. Explain your findings.	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

<b>Content Area: Mathematics</b>		<b>Grade Level: 7</b>		<b>Domain: Statistics and Probability</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Investigate chance processes and develop, use, and evaluate probability models.</b>					
<b>Performance Expectations</b>					
<b>7.SP.C.5</b> Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. Probability near 0 indicates an unlikely event. Probability near $\frac{1}{2}$ is neither likely nor unlikely.		<b>7.SP.C.6</b> Approximate the probability of a chance event by collecting data on the processes that produce it. Observe its long run frequency. Predict the approximate relative frequency given the probability.		<b>7.SP.C.7a</b> Develop a probability model and use it to find probabilities of events. <b>a.</b> Compare probabilities to all outcomes, and use the model to determine probabilities of events.	
<b>7.SP.C.7b</b> Develop a probability model and use it to find probabilities of events. <b>b.</b> Develop a probability model by observing frequencies in data generated from a chance process.					
<b>Performance Expectations Assessment</b>					
Using dice find the probability of rolling a 3; find the probability of rolling an even. Which event is more likely?		Roll a dice 600 times. Predict that a 3 or 6 will occur about 200 times. Explain why this is a good estimate.		If a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. Explain your results.	
Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?					
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. . MP6 - Attend to precision. MP8 - Look for and express regularity in repeated reasoning.</b>					
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.					

<b>Content Area: Mathematics</b>	<b>Grade Level: 7</b>	<b>Domain: Statistics and Probability</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Investigate chance processes and develop, use, and evaluate probability models.</b>		
<b>Performance Expectations</b>		
<b>7.SP.C.8a</b> Find the probabilities of compound events using lists, tables, tree diagrams, and simulations. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	<b>7.SP.C.8b</b> Find the probabilities of compound events using lists, tables, tree diagrams, and simulations. <b>b.</b> Represent sample spaces for compound events. For an event described in everyday language (rolling double sixes) identify the outcomes in the sample space which compose the event.	<b>7.SP.C.8c</b> Find the probabilities of compound events using lists, tables, tree diagrams, and simulations. <b>c.</b> Design and use a simulation to generate frequencies for compound events.
<b>Performance Expectations Assessment</b>		
Explain the sample space for a compound event. Explain why multiplication of probabilities is used in finding compound events	Find all outcomes of rolling two die. What is the probability of rolling double sixes?	Use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP7 - Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.</b>		
<b>Assessment</b> - Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.		

# **Mathematics Curriculum**

## **Grade Eight - Math**

## Structure

### Disciplinary Concepts

- Identify sets of real numbers
- Understand and apply four operations to radicals
- Work with integers and radicals as exponents
- Understand linear equations
- Connect proportion to linear equations
- Understand and work with functions
- Recognize congruence and similarity in geometric figures and models
- Understand and apply the Pythagorean Theorem
- Define formulas for perimeter, area, and volume
- Display and analyze bivariate data

### Enduring Understanding

Students will understand that...

- An equation is a statement about quantities using variables to represent a relationship.
- Properties of numbers and equalities can transform equations to find solutions. Proportionality represents a relationship in which the ratio of two quantities remains constant.
- A single quantity can be represented by many different expressions
- 4. Real world problems can be represented algebraically. In a function, each input value is associated with a unique output.
- Functions can be represented in a variety of ways.
- Equations that represent real world problems can assist in making predictions.
- The idea of exponents can be extended to include zero and negative exponents.
- Properties of real numbers can be used to work with polynomials.
- The most appropriate data representation depends on the type of data.
- Translations can represent movement of data and figures.
- The set of real numbers consists of five sets of numbers.
- All numbers can be compared ( $<$   $>$   $=$ ).

- Specific rules apply to the calculating of positive and negative numbers.
- Exponents and radicals can occur as exponents.
- Operations can be calculated in scientific notation.
- Slope reflects a unit rate.
- Slope intercept form is  $y = mx + b$ .
- Ordered steps are necessary to solve linear equations.
- Solving a system of equations can result in an intersection.
- Linear equations can solve real-world mathematics problems.
- Dilations, translations, and rotations do not change the shape.
- Angles and lines can be used to prove congruence.
- Pythagorean Theorem assists in finding measurements.
- Pythagorean Theorem has real world applications.
- The Pythagorean Theorem can be proven.
- Geometric formulas solve real-world mathematics problems.
- Scatterplots describe data.
- Bivariate measurement can be analyzed.
- Functions model relationships between quantities.
- Geometric figures can be proven congruent.

### Essential Questions

- How can you represent quantities, patterns, and relationships?
- How can you solve equations? What types of relationships are represented by proportions?
- How do you represent relationships between quantities that are not equal?
- Can functions represent real world scenarios?
- What information does the equation of a line offer?
- How do you predict using a scatterplot?
- Can systems of equations represent real world problems?
- How can you represent a value less than 1 with an exponent?
- What are the characteristics of exponential functions?
- How are the properties of real numbers related to polynomials?
- How can collecting and analyzing data help you make decisions or predictions?
- How can translations represent real world scenarios?
- What sets of numbers are real numbers?
- What is an irrational number?
- What does a negative exponent indicate?

- What are applications for scientific notation?
- What is a unit rate?
- How is a unit rate displayed on a coordinate plane?
- What is slope intercept form and how is it applied?
- What are the ordered steps to solve equations?
- How do you simplify an expression?
- What is a system of equations?
- What are the types of intersections found in a linear system?
- What is a function?
- Are functions always linear?
- How do you graph a linear system?
- What is a rotation? A translation? A reflection?
- How does a translation move on a coordinate plane?
- How do you prove the similarity of triangles?
- What are the applications for the Pythagorean Theorem?
- What is the Pythagorean Theorem?
- How do geometric formulas assist with real world problems?
- What is bivariate data?
- How does a straight line model a relationship between two quantities?

### Assessment

Students will be assessed on a regular basis using summative and formative assessments to help guide instruction.

### Grade 8 Overview

Domain	Cluster Headings
<b>The Number System</b>	<ul style="list-style-type: none"> <li>• Know that there are numbers that are not rational and approximate them by rational numbers, and understand properties of rational and irrational numbers.</li> </ul>

<b>Expressions and Equations</b>	<ul style="list-style-type: none"> <li>· Work with radicals and integer exponents.</li> <li>· Understand the connections between proportional relationships, lines, and linear equations.</li> <li>· Analyze and solve linear equations and pairs of simultaneous linear equations.</li> </ul>
<b>Functions</b>	<ul style="list-style-type: none"> <li>· Define, evaluate, and compare functions.</li> <li>· Use functions to model relationships between quantities.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>· Understand congruence and similarity using physical models, transparencies, or geometry software.</li> <li>· Understand and apply the Pythagorean Theorem.</li> <li>· Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>· Investigate patterns of association in bivariate data.</li> </ul>



GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

<b>Content Area:</b> Mathematics	<b>Grade Level:</b> 8	<b>Domain: The Number System</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Know that there are numbers that are not rational, and approximate them by rational numbers.</b>			
<b>Performance Expectations</b>			
<b>8.NS.A.1</b> Know and define the set of irrational numbers. Understand that irrational numbers have non-repeating, unending decimals. Understand that rational numbers have repeating decimals.	<b>8.NS.A.2</b> Use rational approximations of irrational numbers to compare the size. Place on a number line.	<b>8.NS.A.3</b> Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	
<b>Performance Expectations Assessment</b>			
Give an example of a rational number. Give an example of an irrational number.	By truncating the decimal expansion of $\sqrt{2}$ , show that $\sqrt{2}$ is between 1 and 2, between 1.4 and 1.5. Explain how to get better approximation.	Will the sum of two rational numbers be rational or irrational?	
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. . MP6 - Attend to precision. MP8 - Look for and express regularity in repeated reasoning.</b>			
<b>Assessment -</b> <a href="https://docs.google.com/document/d/14tqHlCgIwvvrZpQC5etrIkC2_skU47P5BEHM-kaPk7A/edit?usp=sharing">https://docs.google.com/document/d/14tqHlCgIwvvrZpQC5etrIkC2_skU47P5BEHM-kaPk7A/edit?usp=sharing</a>			

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Expressions and Equations</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Work with radicals and integer exponents</b>			
<b>Performance Expectations</b>			

<b>8.EE.A.1</b> Know and apply the properties of integer exponents to generate equivalent numerical expressions	<b>8.EE.A.2</b> Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ . a. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that is irrational. b. Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares).	<b>8.EE.A.3</b> Use numbers expressed in the form of a single digit times an integer power of 10 to estimate a very large or very small quantity.	<b>8.EE.A.4</b> Perform operations with numbers expressed in scientific notation including both decimal and scientific notation combined. Use scientific notation and choose units of appropriate size for measurements.
<b>Performance Expectations Assessment</b>			
What is the answer to: $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$	Is the $\sqrt{2}$ irrational? What is $4^3$ ? Simplify $\sqrt{8}$	Estimate the U.S. population as $3 \times 10^8$ and World population as $7 \times 10^9$ . How much larger is the world population than the US?	Find an example of scientific notation. What does the number represent?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP6 - Attend to precision. MP8 - Look for and express regularity in repeated reasoning.</b>			
<b>Assessment -</b> <a href="https://docs.google.com/document/d/14tqHJCgiwvvrZpQC5etrIkC2_skU47P5BEHM-kaPk7A/edit?usp=sharing">https://docs.google.com/document/d/14tqHJCgiwvvrZpQC5etrIkC2_skU47P5BEHM-kaPk7A/edit?usp=sharing</a>			

GRADE EIGHT MATH CURRICULUM — PART I OF A BIFURCATED CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Expressions and Equations</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand the connections between proportional relationships, lines, and linear equations.</b>		
<b>Performance Expectations</b>		

<p><b>8.EE.B.5</b> Graph proportional relationships, interpreting unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.</p>	<p><b>8.EE.B.6</b> Use similar triangles to explain why the slope <math>m</math> is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation <math>y = mx + b</math> for a line intercepting the vertical axis at <math>b</math>.</p>
<p><b>Performance Expectations Assessment</b></p>	
<p>Compare a distance-time graph to a distance-time equation. Which of the two moving objects has greater speed?</p>	<p>Given a line on the coordinate plane, derive the equation <math>y = mx + b</math>. What is the slope of the line?</p>
<p><b>Standards for Mathematical Practice: MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP4 Model with Mathematics. MP5 MP6 Attend to precision. MP7 Look for and make use of structure.</b></p>	
<p><b>Assessment - <a href="https://docs.google.com/document/d/1eE_BsAdTlF-zvmJ7mLr8la4oplacVlgjNaP-l3vWE8/edit?usp=sharing">https://docs.google.com/document/d/1eE_BsAdTlF-zvmJ7mLr8la4oplacVlgjNaP-l3vWE8/edit?usp=sharing</a></b></p>	

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Expressions and Equations</b>		
<p><b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.</p>				
<p><b>Standard: Analyze and solve linear equations and pairs of simultaneous linear equations.</b></p>				
<p><b>Performance Expectations</b></p>				
<p><b>8.EE.C.7</b> Solve linear equations in one variable <b>a.</b> which give one solution, many solutions, or no solutions. Transform the equation to <math>x=a</math>, <math>a=a</math>, or <math>a=b</math></p>	<p><b>8.EE.C.7</b> Solve linear equations in one variable <b>b.</b> with rational number coefficients, including combining like terms and the distributive property.</p>	<p><b>8.EE.C.8a</b> Analyze and solve pairs of simultaneous equations: <b>a.</b> understand that their graphs may or may not have points of intersection.</p>	<p><b>8.EE.C.8</b> Analyze and solve pairs of simultaneous equations: <b>b.</b> Solve systems of two linear equations in two variables using the substitution method and estimate solutions by</p>	<p><b>8.EE.C.8</b> Analyze and solve pairs of simultaneous equations: <b>c.</b> that reflect real world applications leading to two linear equations in two variables.</p>

			graphing the equations. Solve simple cases by inspection.	
<b>Performance Expectations Assessment</b>				
Given an equation, show the solution on a coordinate plane?	What is the solution for: $2x + 3 + 5x + 22 - 4x = 30$ ?	Given a system and its graph, identify the common points.	Why can't $3x + 2y = 5$ and $3x + 2y = 6$ have a common solution? Solve $3x + y = 30$ and $y = 2x$ using substitution. Solve $y = 3x + 1$ and $y = -2x + 7$ using substitution.	You have dimes and nickels that equal \$3.15. What are the combinations of coins that you could have?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>				
Assessment - <a href="https://docs.google.com/document/d/1eE_BsAdTlF-zvmJ7mLr8la4opladCVlgjNaP-l3vWE8/edit?usp=sharing">https://docs.google.com/document/d/1eE_BsAdTlF-zvmJ7mLr8la4opladCVlgjNaP-l3vWE8/edit?usp=sharing</a>				

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM


<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Functions</b>
<b>21<sup>st</sup> Century Theme:</b> Student's mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Define, evaluate, and compare functions</b>		
<b>Performance Expectations</b>		
<b>8.F.A.1</b> Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	<b>8.F.A.2</b> Compare properties of two functions each represented in a different way (algebraically, graphically, numerically, in tables, or by verbal descriptions).	<b>8.F.A.3</b> Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line: give examples of functions that are not linear.
<b>Performance Expectations Assessment</b>		
Is the set of inputs/outputs a function? $\left[ \begin{array}{cc} 2 & 4 \\ 3 & 4 \end{array} \right]$	Given a linear function from a table of values and a linear function represented by an	The function $A = s^2$ gives the area of the square as a function of its side length. Explain why it is not a linear function.

5	5	expression, which function has the greatest rate of change?
Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP8 - Look for and express regularity in repeated reasoning.		
Assessment - <a href="https://docs.google.com/document/d/1eE_BsAdTlF-zvmI7mLr8la4opladCVIglNaP-l3vWE8/edit?usp=sharing">https://docs.google.com/document/d/1eE_BsAdTlF-zvmI7mLr8la4opladCVIglNaP-l3vWE8/edit?usp=sharing</a>		

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Functions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Use functions to model relationships between quantities</b>		
<b>Performance Expectations</b>		
<b>8.F.B.4</b> Construct a function to model a linear relationship between two quantities. Determine the rate of change and the initial value of the function from a description of a relationship or from two (x, y) values. Read from a table or a graph of the function.	<b>8.F.B.5</b> Describe qualitatively the functional relationship between two quantities by analyzing a graph (where it increases/ decreases, linear/nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
<b>Performance Expectations Assessment</b>		
A car drives 40 mph and uses one gallon of gas every twenty miles. What is the function that represents the relationship?	If a ball is thrown in an arc, what is the relationship and what would the graph resemble?	
Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.		
Assessment - <a href="https://docs.google.com/document/d/1eE_BsAdTlF-zvmI7mLr8la4opladCVIglNaP-l3vWE8/edit?usp=sharing">https://docs.google.com/document/d/1eE_BsAdTlF-zvmI7mLr8la4opladCVIglNaP-l3vWE8/edit?usp=sharing</a>		

<b>Content Area: Mathematics</b>		<b>Grade Level: 8</b>		<b>Domain: Geometry</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Understand congruence and similarity using physical models, transparencies, or geometry software.</b>					
<b>Performance Expectations</b>					
<b>8.G.A.1</b> Verify experimentally the properties of rotations, reflections, and translations <b>a.</b> where lines are taken to lines, and line segments to line segments of the same length.	<b>8.G.A.1</b> Verify experimentally the properties of rotations, reflections, and translations: <b>b.</b> where angles are taken to angles of the same measure.	<b>8.G.A.1</b> Verify experimentally the properties of rotations, reflections, and translations: <b>c.</b> where parallel lines are taken to parallel lines.	<b>8.G.A.2</b> Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; <hr style="width: 50%; margin: 5px auto;"/> + Given two congruent figures describe a sequence that exhibits the congruence between them.		
<b>Performance Expectations Assessment</b>					
 What is the relationship between the two shapes?	Hold a shape to a mirror. Look at the angles. What property does this demonstrate?	Use two identical books placed differently on a desk. What property do the books demonstrate?	Use a trapezoid pattern block. What property will assist you to make the <u>pattern upside down</u> ? Look at the two shapes. What properties were used to move it? Are they congruent shapes?		
<b>Standards for Mathematical Practice: MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision.</b>					
<b>Assessment -</b> <a href="https://drive.google.com/open?id=0B6cERivn5wyWemhnajRvUGo4T0E">https://drive.google.com/open?id=0B6cERivn5wyWemhnajRvUGo4T0E</a>					

<b>Content Area: Mathematics</b>		<b>Grade Level: 8</b>		<b>Domain: Geometry</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					

<b>Standard: Understand congruence and similarity using physical models, transparencies, or geometry software.</b>		
<b>Performance Expectations</b>		
<b>8.G.A.3</b> Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	<b>8.G.A.4</b> Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits this similarity between them.	<b>8.G.A.5</b> Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
<b>Performance Expectations Assessment</b>		
Draw a triangle on the coordinate plane. What do you need to do to draw a translation of the triangle on the plane?	Given two similar figures on the coordinate plane, explain the sequence of properties.	Given parallel lines with a transversal, identify the measurement of all angles.
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
Assessment - <a href="https://drive.google.com/open?id=0B6cERivn5wyWemhnajRvUGo4T0E">https://drive.google.com/open?id=0B6cERivn5wyWemhnajRvUGo4T0E</a>		

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Understand and apply the Pythagorean Theorem</b>		
<b>Performance Expectations</b>		

<b>8.G.B.6</b> Explain a proof of the Pythagorean Theorem	<b>8.G.B.7</b> Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	<b>8.G.B.8</b> Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
<b>Performance Expectations Assessment</b>		
How do squares assist in proving the Pythagorean Theorem?	You have the diagonal and one side measurement of a backyard. Can you use the Pythagorean Theorem to find the perimeter of the yard?	Given three points in a coordinate plane, what is the measurement of the diagonal of the triangle?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		
<b>Assessment - <a href="https://docs.google.com/document/d/1yClqRhWWkC_XS1eFojJ5HnHE0JGWhKk80_yLzXXRzPM/edit?usp=sharing">https://docs.google.com/document/d/1yClqRhWWkC_XS1eFojJ5HnHE0JGWhKk80_yLzXXRzPM/edit?usp=sharing</a></b>		

GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 8</b>	<b>Domain: Geometry</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</b>		
<b>Performance Expectations</b>		
<b>8.G.C.9</b> Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.		
<b>Performance Expectations Assessment</b>		
A cylinder with $h=60$ , $d=12$ , needs to be $\frac{3}{4}$ full of water. How much water does it need?		
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP4 - Model with Mathematics. MP6 - Attend to precision. . MP8 - Look for and express regularity in repeated reasoning.</b>		



GRADE EIGHT MATH CURRICULUM – PART I OF A BIFURCATED CURRICULUM

<b>Content Area: Mathematics</b>		<b>Grade Level: 8</b>		<b>Domain: Statistics and Probability</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Investigate patterns of association in bivariate data</b>					
<b>Performance Expectations</b>					
<b>8.SPA.1</b> Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.		<b>8.SPA.2</b> Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.		<b>8.SPA.3</b> Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	
<b>8.SPA.4</b> Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for 2 rows or columns to describe possible association between the 2 variables.					
<b>Performance Expectations Assessment</b>					
After creating a scatterplot of age/heart rate for the class, is there a positive or negative relationship?		What is the line of best fit for the heart rate experiment?		An additional hour of sunlight each day gives plants an additional 1.5 cm of plant height. What is the linear model for this?	
				Collect data on students’ chores at home and their hour of curfew. Is there evidence that those with curfew are those with chores?	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP8 - Look for and express regularity in repeated reasoning.</b>					
Assessment <a href="https://docs.google.com/document/d/1k48n3v2yE-GO9gqNpLsUIyxHzMMf43-g65dEUadcAU/edit?usp=sharing">https://docs.google.com/document/d/1k48n3v2yE-GO9gqNpLsUIyxHzMMf43-g65dEUadcAU/edit?usp=sharing</a>					

# **Mathematics Curriculum**

## **Grade Eight - Algebra**

## Structure

### Disciplinary Concepts

- Expressions use variables to represent information
- Simplifying expressions follows a specific order
- An expression has an underlying structure
- Algebraic expressions and equations are governed by properties of operations
- An equation is two equal expressions
- An equation with one variable results in a set of numbers
- An equation with two variables results in an ordered pair
- An inequality defines a comparison ( $<$   $>$  )
- A system can consist of two equations or inequalities
- Some equations have no solution
- Formulas can be rearranged similarly to equations
- Functions contain an input and an output
- Polynomials follow properties of operations
- Graphs represent equations or inequalities
- Quadratic equations can be factored and zeros of the equation calculated

### Enduring Understanding

Students will understand that...

- An equation is a statement about quantities using variables to represent a relationship.
- Properties of numbers and equalities can transform equations to find solutions.
- Proportionality represents a relationship in which the ratio of two quantities remain constant.
- A single quantity can be represented by many different expressions.
- Real world problems can be represented algebraically. In a function, each input value is associated with a unique output.
- Functions can be represented in a variety of ways.

- Equations that represent real world problems can assist in making predictions.
- The idea of exponents can be extended to include zero and negative exponents.
- Properties of real numbers can be used to work with polynomials.
- Quadratic functions can be solved in a variety of methods. Quadratic functions can represent real world problems.
- Operations can be performed with radical expressions.
- The four operations and properties can be applied to rational equations.
- The most appropriate data representation depends on the type of data.
- Expressions use variables to represent the unknown.
- Expressions can be rewritten and simplified.
- Quadratic equations can be solved by factoring or the quadratic formula.
- Properties of exponents assist in transforming expressions.
- Polynomials are closed under the operations of addition, subtraction, and multiplication.
- Using the zeros of a function can help in graphing the function.
- Rational expressions can be rewritten in different forms.
- Equations in two or more variables represent relationships.
- Solving equations is a process of reasoning.
- Linear equations can be solved and graphed on the coordinate plane.
- Solving equations requires a series of ordered steps.
- Completing the square transforms a quadratic equation.
- Quadratic equations can be solved by inspection ( $x^2 = 49$ ), completing the square, quadratic formula, or factoring.
- Substitution assists in solving a system of equations.
- Graphing a system of equations results in an intersection or no solution.
- Real life situations can be solved with equations.

### Essential Questions

- How can you represent quantities, patterns, and relationships?
- How can you solve equations? What types of relationships are represented by proportions?
- How do you represent relationships between quantities that are not equal?
- Can functions represent real world scenarios?
- What information does the equation of a line offer?
- How do you predict using a scatterplot?
- Can systems of equations represent real world problems?
- How can you represent a value less than 1 with an exponent?
- What are the characteristics of exponential functions?
- How are the properties of real numbers related to polynomials?

- What are the characteristics of quadratic functions?
- How are radical expressions represented?
- How can you solve a rational equation?
- How can collecting and analyzing data help you make decisions or predictions?
- What is an expression?
- Can expressions be combined?
- Can an expression be rewritten?
- How do you factor a quadratic equation?
- What is the benefit of completing the square?
- Can exponents be utilized in expressions?
- What operations can be used with polynomials?
- What are the zeros of an equation?
- What properties of operations can be used with polynomials?
- Can an equation be used to solve real world problems?
- What is an extraneous solution?
- What is the process for solving an equation?
- What is the result when you solve a one variable equation?
- What is the result when you solve a two variable equation?
- What is a system of equations?
- What is the solution set for a linear equation?
- What is the solution set for an inequality?
- How are a linear equation, a linear system, and quadratic equations different?
- How are the graphs different for a linear system, and quadratic equations different?
- How does the quadratic formula solve a quadratic equation?

### Algebra Overview

Domain	Cluster Headings
<b>Arithmetic with Polynomials and Rational Functions</b>	<ul style="list-style-type: none"> <li>• Perform arithmetic operations on polynomials</li> <li>• Understand the relationship between zeros and factors of polynomials</li> <li>• Use polynomial identities to solve problems</li> <li>• Rewrite rational expressions</li> </ul>

<b>Creating Equations</b>	Create equations that describe numbers or relationships
<b>Reasoning with Equations and Inequalities</b>	<ul style="list-style-type: none"> <li>• Understand solving equations as a process of reasoning and explain the reasoning</li> <li>• Solve equations and inequalities in one variable</li> <li>• Solve systems of equations</li> <li>• Represent and solve equations and inequalities graphically</li> </ul>
<b>Seeing Structure in Expressions</b>	<ul style="list-style-type: none"> <li>• Interpret the structure of expressions</li> <li>• Write expressions in equivalent forms to solve problems</li> </ul>

### **MATHEMATICS STANDARDS FOR HIGH SCHOOL**

THE HIGH SCHOOL STANDARDS SPECIFY THE MATHEMATICS THAT ALL STUDENTS SHOULD STUDY IN ORDER TO BE COLLEGE AND CAREER READY. ADDITIONAL MATHEMATICS THAT STUDENTS SHOULD LEARN IN ORDER TO TAKE ADVANCED COURSES SUCH AS CALCULUS, ADVANCED STATISTICS, OR DISCRETE MATHEMATICS IS INDICATED BY ( **+** ), AS IN THIS EXAMPLE:

ALL STANDARDS WITHOUT A ( **+** ) SYMBOL SHOULD BE IN THE COMMON MATHEMATICS CURRICULUM FOR ALL COLLEGE AND CAREER READY STUDENTS.

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Arithmetic with Polynomials and Rational Expressions</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Perform arithmetic operations on polynomials</b>		<b>Standard: Understand the relationship between zeros and factors of polynomials</b>	
<b>Performance Expectations</b>		<b>Performance Expectations</b>	
<b>A.APR.A.1</b> Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	<b>A.APR.B.2</b> Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number $a$ , the remainder on division by $x-a$ is $p(a)$ , so $p(a)=0$ if and only if $x-a$ is a factor of $p(x)$ .	<b>A.APR.B.3</b> Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.  What are the zeros of the equation $x^2 - 2x - 15$ ?	
<b>Performance Expectations Assessment</b>			
What are the steps to combine polynomial expressions?	What steps do you take to apply the Remainder Theorem?	What are the zeros of the equation $x^2 - 2x - 15$ ?	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.</b>			

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Arithmetic with Polynomial and Rational Expressions</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.			
<b>Standard: Use polynomial identities to solve problems</b>			
<b>Performance Expectations</b>			

<b>A.APR.C.4 ( + )</b> Prove polynomial identities and use them to describe numerical relationships.	<b>A.APR.C.5</b> Know and apply the expansion of $(x + y)^n$ .
<b>Performance Expectations Assessment</b>	
Does $(x^2 + y^2) = (x^2 - y^2) + (2xy)$	Factor $(x + 3y)^2$
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>	

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GRADE EIGHT ALGEBRA CURRICULUM – PART II OF A BIFURCATED CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Arithmetic with Polynomials and Rational Expressions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Rewrite rational expressions</b>		
<b>Performance Expectations</b>		
<b>A.APR.D.6</b> Rewrite simple rational expressions in different forms.	<b>A.APR.D.7</b> Add, subtract, multiply and divide rational expressions. Understand that rational expressions are analogous to rational numbers.	
<b>Performance Expectations Assessment</b>		
Does $4x/7x = 2x/7x + 2x/7x$ ?	Are rational expressions closed under addition, subtraction, multiplication, and division (non-zero denominator)?	
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		



<b>Content Area: Mathematics</b>		<b>Grade Level: 8A</b>		<b>Domain: Create Equations</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Create equations that describe numbers or relationships</b>					
<b>Performance Expectations</b>					
<b>A.CED.A.1</b> Create equations and inequalities in one variable and use them to solve problems.		<b>A.CED.A.2</b> Create equations in two or more variables to represent relationships between quantities; graph equation on coordinate axes with labels and scales.		<b>A.CED.A.3</b> Represent constraints for equations and inequalities (and systems of). Identify the numbers that will not work in the situation.	
<b>A.CED.A.4</b> Rearrange formulas to solve for a different variable.					
<b>Performance Expectations Assessment</b>					
What is the difference between a linear and quadratic equation?		How is a linear graph different from a quadratic graph?		Graph a system of quadratic equations. Which area does not fit the system?	
Solve for $r$ in the equation $d = rt$ .					
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>					

<b>Content Area: Mathematics</b>		<b>Grade Level: 8A</b>		<b>Domain: Reasoning with Equations and Inequalities</b>	
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.					
<b>Standard: Understand solving equations as a process of reasoning and explain the reasoning</b>					
<b>Performance Expectations</b>					

<b>A.REI.A.1</b> Explain each step in solving an equation.	<b>A.REI.A.2</b> Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
<b>Performance Expectations Assessment</b>	
What are the steps to solve for x in an equation?	What is the first step in solving an equation with radicals in it?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP8 - Look for and express regularity in repeated reasoning.</b>	

GRADE EIGHT ALGEBRA CURRICULUM – PART II OF A BIFURCATED CURRICULUM

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<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Reasoning with Equations and Inequalities</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve equations and inequalities in one variable</b>		
<b>Performance Expectations</b>		
<b>A.REI.B.3</b> Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	<b>A.REI.B.4a</b> a.Solve quadratic equations in one variable: <b>a.</b> Use the method of completing the square to transform a quadratic equation.	<b>A.REI.B.4b</b> Solve quadratic equations in one variable: using square roots, completing the square, the quadratic formula, and factoring.
<b>Performance Expectations Assessment</b>		
What is the first step to solve the inequality $Ax + 6 = 24$ ?	How do you complete the square for $X^2 + 4x + 5 = 7$ ?	What is the quadratic formula and when is it used?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP8 - Look for and express regularity in repeated reasoning.</b>		

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Reasoning with Equations and Inequalities</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve systems of equations</b>		
<b>Performance Expectations</b>		
<b>A.REI.C.5 ( + )</b> Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	<b>A.REI.C.6</b> Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.	<b>A.REI.C.7</b> Solve systems consisting of a linear equation and a quadratic equation.
<b>Performance Expectations Assessment</b>		
What does substitution mean for solving a system?	How will a graph appear if each line has the same y intercept?	What are the points of intersection for $y = -3x$ and $x^2 + y^2 = 3$ ?
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure</b>		

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Reasoning with Equations and Inequalities</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Solve systems of equations</b>		
<b>Performance Expectations</b>		

<b>A.REI.C.8 ( + )</b> Represent a system of linear equations as a single matrix equation in a vector variable.	<b>A.REI.C.9 ( + )</b> Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension $3 \times 3$ or greater).
<b>Performance Expectations Assessment</b>	
Write the systems of equations as a vector equation. $3x+4y=7$ and $y=-4x+3$	Find the inverse of a matrix to solve systems of linear equations. $x+2y+2z=5$ $3x-2y+z=-6$ $2x+y-z=-1$
<b>Standards for Mathematical Practice: MP1- Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure</b>	

GRADE EIGHT ALGEBRA CURRICULUM – PART II OF A BIFURCATED CURRICULUM

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Reasoning with Equations and Inequalities</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Represent and solve equations and inequalities graphically</b>		
<b>Performance Expectations</b>		
<b>A.REI.D.10</b> Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.	<b>A.REI.D.11</b> Explain why the intersection of $y = f(x)$ and $y = g(x)$ is the solution to $f(x) = g(x)$ .	<b>A.REI.D.12</b> Graph linear inequalities and linear inequality systems in two variables. Find the intersection for the systems.
<b>Performance Expectations Assessment</b>		
How do you graph a line in slope intercept form?	How do you find the solution to a system in two variables?	When looking at a graphed system, how do you identify the common solutions?
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP4 - Model with Mathematics. MP5 - Use appropriate tools strategically. MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b>		

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Seeing structure in Expressions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Interpret the structure of expressions</b>		
<b>Performance Expectations</b>		
<b>A.SSE.A.1a</b> Interpret expressions that represent a quantity in terms of its context: a. Interpret parts of an expression, such as terms, factors, and coefficients.	<b>A.SSE.A.1b</b> Interpret expressions that represent a quantity in terms of its context: b. Interpret complicated expressions by viewing one or more of their parts as a single entity.	<b>A.SSE.A.2</b> Use the structure of an expression to identify ways to rewrite it.
<b>Performance Expectations Assessment</b>		
What is the coefficient of the expression $3x^2y^3z^4$ ?	Does $1+r$ depend on the other factor $P$ in the expression $(P(1+r))^n$ ? <i>No</i>	Is $x^4 - y^4 = (x^2)^2 - (y^2)^2$ a true statement? <i>yes</i>
<b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. MP8 - Look for and express regularity in repeated reasoning.</b>		

<b>Content Area: Mathematics</b>	<b>Grade Level: 8A</b>	<b>Domain: Seeing Structure in Expressions</b>
<b>21<sup>st</sup> Century Theme:</b> Student’s mathematical skills accompanied by creativity, perseverance in problem-solving, and collaborative efforts supports competent engagement in future personal, work and civic life.		
<b>Standard: Write expressions in equivalent forms to solve problems</b>		
<b>Performance Expectations</b>		

<p><b>A.SSE.B.3a</b> Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression: <b>a</b> . Factor a quadratic expression to reveal the zeros of the function it defines.</p>	<p><b>A.SSE.B.3b</b> Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression: <b>b</b> . Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.</p>	<p><b>A.SSE.B.3c</b> Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression: <b>c</b> . Use the properties of exponents to transform expressions for exponential functions.</p>	<p><b>A.SSE.B.4 ( + )</b> Derive the formula for the sum of a finite geometric series (when the common ratio is not 1) and use the formula to solve problems.</p>
<b>Performance Expectations Assessment</b>			
<p>Factor the expression <math>X^2 + 8x + 15</math></p>	<p>Complete the square for <math>X^2 + 4x - 13 = 0</math></p>	<p>Simplify <math>(x + 2)^2 + x^2</math> ?</p>	<p>What is the mortgage payment on a \$150,000 mortgage?</p>
<p><b>Standards for Mathematical Practice: MP1 - Make sense of problems and persevere in solving them. MP2 - Reason abstractly and quantitatively. MP3 - Construct viable arguments and critique the reasoning of others. . MP6 - Attend to precision. MP7 - Look for and make use of structure. MP8 - Look for and express regularity in repeated reasoning.</b></p>			

**Addition and subtraction within 5, 10, 20, 100, or 1000** Addition or subtraction of two whole numbers with whole number answers, and with sum or minuend in the range 0-5, 0-10, 0-20, or 0-100, respectively. Example:  $8 + 2 = 10$  is an addition within 10,  $14 - 5 = 9$  is a subtraction within 20, and  $55 - 18 = 37$  is a subtraction within 100.

**Additive inverses** Two numbers whose sum is 0 are additive inverses of one another. Example:  $3/4$  and  $-3/4$  are additive inverses of one another because  $3/4 + (-3/4) = (-3/4) + 3/4 = 0$ .

**Associative property of addition** See Table 3 in this Glossary.

**Associative property of multiplication** See Table 3 in this Glossary.

**Bivariate data** Pairs of linked numerical observations. Example: a list of heights and weights for each player on a football team.

**Box plot.** A method of visually displaying a distribution of data values by using the median, quartiles, and extremes of the data set. A box shows the middle 50% of the data.

**Commutative property** See Table 3 in this Glossary.

**Complex fraction** A fraction  $A/B$  where  $A$  and/or  $B$  are fractions ( $B$  nonzero).

**Computation algorithm** A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly. *See also:* computation strategy.

**Computation strategy.** Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another. *See also:* computation algorithm.

**Congruent** Two plane or solid figures are congruent if one can be obtained from the other by rigid motion (a sequence of rotations, reflections, and translations).

**Counting on** A strategy for finding the number of objects in a group without having to count every member of the group. For example, if a stack of books is known to have 8 books and 3 more books are added to the top, it is not necessary to count the stack all over again. One can find the total by *counting on*—pointing to the top book and saying “eight,” following this with “nine, ten, eleven. There are eleven books now.”

**Dot plot** *See:* line plot.

**Dilation** A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.

**Expanded form** A multi-digit number is expressed in expanded form when it is written as a sum of single-digit multiples of powers of ten. For example,  $643 = 600 + 40 + 3$ .

**Expected value** For a random variable, the weighted average of its possible values, with weights given by their respective probabilities.

**First quartile** For a data set with median  $M$ , the first quartile is the median of the data values less than  $M$ . Example: For the data set {1, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the first quartile is 6.2 *See also:* median, third quartile. (Many different methods for computing quartiles are in use. The method defined here is sometimes called the Moore and McCabe method.)

**Fraction** A number expressible in the form  $a/b$  where  $a$  is a whole number and  $b$  is a positive whole number. (The word *fraction* in these standards always refers to a non-negative number.) *See also:* rational number.

**Identity property of 0** *See* Table 3 in this Glossary.

**Independently combined probability models** Two probability models are said to be combined independently if the probability of each ordered pair in the combined model equals the product of the original probabilities of the two individual outcomes in the ordered pair.

**Integer** A number expressible in the form  $a$  or  $-a$  for some whole number  $a$ .



**Line plot** A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. Also known as a dot plot.<sup>3</sup>

**Mean** A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list.<sup>4</sup> Example: For the data set {1, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean is 21.

**Mean absolute deviation** A measure of variation in a set of numerical data, computed by adding the distances between each data value and the mean, then dividing by the number of data values. Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean absolute deviation is 20.

**Median** A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list—or the mean of the two central values, if the list contains an even number of values. Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 90}, the median is 11.

**Midline** In the graph of a trigonometric function, the horizontal line halfway between its maximum and minimum values.

**Multiplication and division within 100** Multiplication or division of two whole numbers with whole number answers, and with product or dividend in the range 0-100. Example:  $72 \div 8 = 9$ .

**Multiplicative inverses** Two numbers whose product is 1 are multiplicative inverses of one another. Example:  $\frac{3}{4}$  and  $\frac{4}{3}$  are multiplicative inverses of one another because  $\frac{3}{4} \times \frac{4}{3} = \frac{4}{3} \times \frac{3}{4} = 1$ .

**Number line diagram** A diagram of the number line used to represent numbers and support reasoning about them. In a number line diagram for measurement quantities, the interval from 0 to 1 on the diagram represents the unit of measure for the quantity.

**Percent rate of change** A rate of change expressed as a percent. Example: if a population grows from 50 to 55 in a year, it grows by  $\frac{5}{50} = 10\%$  per year.

**Probability distribution** The set of possible values of a random variable with a probability assigned to each.

**Properties of operations** See Table 3 in this Glossary.

**Properties of equality** See Table 4 in this Glossary.

**Properties of inequality** See Table 5 in this Glossary.

**Properties of operation** See Table 3 in this Glossary.

**Probability** A number between 0 and 1 used to quantify likelihood for processes that have uncertain outcomes (such as tossing a coin, selecting a person at random from a group of people, tossing a ball at a target, or testing for a medical condition).

**Probability model** A probability model is used to assign probabilities to outcomes of a chance process by examining the nature of the process. The set of all outcomes is called the sample space, and their probabilities sum to 1. *See also:* uniform probability model.

**Random variable** An assignment of a numerical value to each outcome in a sample space.

**Rational expression** A quotient of two polynomials with a non-zero denominator.

**Rational number** A number expressible in the form  $a/b$  or  $-a/b$  for some fraction  $a/b$ . The rational numbers include the integers.

**Rectilinear figure** A polygon all angles of which are right angles.

**Rigid motion** A transformation of points in space consisting of a sequence of one or more translations, reflections, and/or rotations. Rigid motions are here assumed to preserve distances and angle measures.

**Repeating decimal** The decimal form of a rational number. *See also:* terminating decimal.

**Sample space** In a probability model for a random process, a list of the individual outcomes that are to be considered.

**Scatter plot** A graph in the coordinate plane representing a set of bivariate data. For example, the heights and weights of a group of people could be displayed on a scatter plot.<sup>5</sup>

**Similarity transformation** A rigid motion followed by a dilation.

**Tape diagram** A drawing that looks like a segment of tape, used to illustrate number relationships. Also known as a strip diagram, bar model, fraction strip, or length model.

**Terminating decimal** A decimal is called terminating if its repeating digit is 0.

**Third quartile** For a data set with median  $M$ , the third quartile is the median of the data values greater than  $M$ . Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the third quartile is 15. *See also:* median, first quartile. (Many different methods for computing quartiles are in use. The method defined here is sometimes called the Moore and McCabe method.)

**Transitivity principle for indirect measurement** If the length of object A is greater than the length of object B, and the length of object B is greater than the length of object C, then the length of object A is greater than the length of object C. This principle applies to measurement of other quantities as well.

**Uniform probability model** A probability model which assigns equal probability to all outcomes. *See also:* probability model.

**Vector** A quantity with magnitude and direction in the plane or in space, defined by an ordered pair or triple of real numbers.

**Visual fraction model** A tape diagram, number line diagram, or area model.

**Whole numbers** The numbers 0, 1, 2, 3, .... 5

Adapted from Wisconsin Department of Public Instruction, <http://dpi.wi.gov/standards/mathglos.html>, accessed March 2, 2010.

**Algebra**  
**Table 1**  
**Properties of Operations**

Here  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number system.

<i>Associative property of addition</i>	$(a + b) + c = a + (b + c)$
<i>Commutative property of addition</i>	$a + b = b + a$
<i>Additive identity property of 0</i>	$a + 0 = 0 + a = a$
<i>Existence of additive inverses</i>	For every $a$ there exists $-a$ so that $a + (-a) = (-a) + a = 0$ .
<i>Associative property of multiplication</i>	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
<i>Commutative property of multiplication</i>	$a \cdot b = b \cdot a$
<i>Multiplicative identity property of 1</i>	$a \cdot 1 = 1 \cdot a = a$
<i>Existence of multiplicative inverses</i>	For every $a$ there exists $1/a$ so that $a \cdot 1/a = 1/a \cdot a = 1$ .
<i>Distributive property of multiplication over addition</i>	$a \cdot (b + c) = a \cdot b + a \cdot c$

**Table 2**  
**Properties of Equality**

Here  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in the rational, real, or complex number systems.

<i>Reflexive property of equality</i>	$a = a$
<i>Symmetric property of equality</i>	If $a = b$ , then $b = a$ .
<i>Transitive property of equality</i>	If $a = b$ and $b = c$ , then $a = c$ .
<i>Addition property of equality</i>	If $a = b$ , then $a + c = b + c$ .
<i>Subtraction property of equality</i>	If $a = b$ , then $a - c = b - c$ .
<i>Multiplication property of equality</i>	If $a = b$ , then $a \cdot c = b \cdot c$ .
<i>Division property of equality</i>	If $a = b$ and $c \neq 0$ , then $a \div c = b \div c$ .
<i>Substitution property of equality</i>	If $a = b$ , then $b$ may be substituted for $a$ in any expression containing $a$ .

**Table 3**  
**Properties of Inequality**

Here  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in the rational or real number systems. Exactly one of the following is true:  $a < b$ ,  $a = b$ ,  $a > b$ .

If  $a > b$  and  $b > c$  then  $a > c$ .

If  $a > b$ , then  $b < a$ .

If  $a > b$ , then  $-a < -b$ .

If  $a > b$ , then  $a \pm c > b \pm c$ .

If  $a > b$  and  $c > 0$ , then  $a \cdot c > b \cdot c$ .

If  $a > b$  and  $c < 0$ , then  $a \cdot c < b \cdot c$ .

If  $a > b$  and  $c > 0$ , then  $a \div c > b \div c$ .

If  $a > b$  and  $c < 0$ , then  $a \div c < b \div c$ .



# RESOURCES

Materials & Resources, Interdisciplinary Connections, Technology, Assessments, Pacing - Included at each grade level- **(Included in curriculum shared with staff)**

## [Scope and Sequence](#)

📄 2023 NJSLS Math Standards.pdf

## [NJ Model Curriculum](#)

## [NJSLS Curricular Units](#)

📄 enV K-12 2024 Equity & Inclusion Brochure.pdf

## [SEL Competencies](#)

## [NJDOE SEL](#)

## [Amistad](#)

## [Holocaust](#)

## [Italian American Heritage](#)

## [Asian American /Pacific Islander Commission](#)

## [Climate Change Standards Support](#)

📄 Math Climate Change Companion Guide.pdf

# REFERENCES

ELL, Instructional Strategies, Differentiation, Students at Risk, Modifications - Included at each grade level

[Bilingual/ESL Education](#): This website provides resources to help educators understand and implement effective instructional strategies for bilingual/ESL students.

[Gifted & Talented](#): This website provides resources to help educators understand and implement effective instructional strategies for Gifted and Talented students.

[Special Education](#): This website provides resources to help educators understand and implement effective instructional strategies for students with high frequency learning challenges.



# APPENDIX 1

## Grade Required Fluencies

Fluent means “fast and accurate”. Fluent is not halting, stumbling, or reversing oneself. Assessing fluencies requires attending to time.

GRADE	FLUENCY
K	Add/ Subtract within 5
1	Add/ Subtract within 10
2	Add/ Subtract within 20 Add/ Subtract within 100
3	Multiply/ Divide within 100 Add/ Subtract within 100
4	Add/ Subtract within 1,000,000
5	Multi-digit multiplication
6	Multi-digit division Multi-digit decimal operations
7	Solve $px + q = r$ , $p(x + q) = r$
8	Solve simple 2 x 2 systems by inspection

# APPENDIX 2

[New Jersey Statutes and Regulations](#)

[Ogdensburg Borough School District Policies and Regulations](#) (Type “Curriculum” in the search bar)

[OBSD Policy and Regulations Synopsis](#)

## Administrative Code<sup>1</sup>

### New Jersey Administrative Code Summary and Statutes Curriculum Development: Integration of 21st Century Skills and Themes and Interdisciplinary Connections

- District boards of education shall be responsible for the review and continuous improvement of curriculum and instruction based upon changes in knowledge, technology, assessment results, and modifications to the NJSLs, according to N.J.A.C. 6A:8-2. 1.
- District boards of education shall include interdisciplinary connections throughout the K–12 curriculum. 2. District boards of education shall integrate into the curriculum 21st century themes and skills ([N.J.A.C. 6A:8-3.1\(c\)2](#)).

### Twenty-first century themes and skills integrated into all content standards areas (N.J.A.C. 6A:8-1.1(a)3).

“Twenty-first century themes and skills” means themes such as global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; learning and innovation skills, including creativity and innovation, critical thinking and problem solving, and communication and collaboration; information, media, and technology skills; and life and career skills, including flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility.

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<sup>1</sup> <https://www.nj.gov/education/cccs/2020/NJSLs-Science.pdf>

[From NJDOE :](#) Please note that Administrative Code requires that the local curriculum include, but is not limited to:

1. A pacing guide;
2. A list of core instructional materials, including various levels of texts at each grade level;
3. Benchmark assessments; and
4. Modifications for special education students, for ELLs in accordance with N.J.A.C. 6A:15, for students at risk of school failure, and for gifted students.

### **Dissection Law**

[N.J.S.A. 18A:35-4.25](#) and [N.J.S.A. 18A:35-4.24](#) authorizes parents or guardians to assert the right of their children to refuse to dissect, vivisection, incubate, capture or otherwise harm or destroy animals or any parts thereof as part of a course of instruction.

### **Amistad Law:** [N.J.S.A. 18A 52:16A-88](#)

Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

### **Holocaust Law:** [N.J.S.A. 18A:35-28](#)

Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

### **LGBT and Disabilities Law:** [N.J.S.A. 18A:35-4.35](#)

A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards ([N.J.S.A. 18A:35-4.36](#)). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

**African American History** [N.J.S.A. 18A:35-1](#) Requires 2 years of US History in high schools including history of New Jersey and of African-Americans

## **Asian American Pacific Islander :**

**S3764** that will ensure that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards for Social Studies for students in kindergarten through Grade 12.

**S4021** will create an AAPI curriculum requirement for schools and S3764 will establish the Commission for Asian American Heritage within the Department of Education.

**Dating Violence** [N.J.S.A. 35-4.23](#)

**Sexual Assault** [N.J.S.A. 35-4.3](#) [National Sexual Assault Resource Center](#)

**Dangers of Sexting** [N.J.S.A. 35-4.33](#) [Common Sense Education](#)

**Deaf Students Bill of Rights** [N.J.S.A. 46-2.7](#)

**Digital Citizenship/ Social Media** [N.J.S.A. 35-4.27](#) [Digital Citizenship](#) [Social Media](#)

## **Climate Change**

### **Standards in Action: Climate Change**

By its very nature, art has the power to inform or draw attention to a specific topic. It is always about something. In fact, the increasing prevalence of activist art in the past decade evidences the power of the arts to communicate big ideas. The aim of activist art is to change the world by inspiring people to take action against societal problems (Nurmis, 2016) – including global climate change. For example, when students engage in the creation and presentation of media artwork, or when devising a theatrical work exploring the social and economic implications of climate change (e.g., impacts on human health, agriculture, food security, water supply, transportation, energy systems, ecosystems), one might expect to see students working collaboratively to research the complex impacts of global climate change on the economy and quality of daily living for people throughout the world. Ultimately, by being culturally engaging, and tapping into the creative potential of the arts to shape perception, students can New Jersey Department of Education June 2020 4 contribute to imagining a new and better future for humankind (Curtis, Reid, & Ballard, 2012; Hulme, 2009; Marks, Chandler, & Baldwin, 2014; Nurmis, 2016) through their artwork. This holds true for students now, and as adults in the workplace. It is not inconceivable that learning to leverage the capacity of the arts to raise awareness about the effects of climate change could yield employment opportunities focused on combating the negative effects of climate change and other societal global issues.

[2020 New Jersey Student Learning Standards Kindergarten through Grade 12](#)