



Township Public Schools

Wayne, New Jersey

**Middle School Mathematics Department
Sixth Grade 1A Mathematics Curriculum Guide
July 2022
Revised**

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This curriculum may be modified through varying techniques, strategies, and materials as per an individual student's Individualized Educational Plan (IEP)

Approved by the Wayne Township Board of Education at the regular meeting held on
September 8, 2022

Wayne Township Public Schools - Mathematics - Grade 6 - Track 1A - Pacing Guide																																				
Month	Sept				Oct				Nov				Dec				Jan				Feb/March				March/April				April/May				June			
Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Unit 1: Number System	Launch	X	X	X	X	X	X	X	X																											
Unit 2: Number System Continued									X	X																										
Unit 3: Ratios and Proportional Relationships											X	X	X	X	X	X																				
Unit 4: Ratios and Proportional Relationships Continued																	X	X																		
Unit 5: Expressions and Equations																		X	X	X	X	X	X													
Unit 6: Expressions and Equations Continued																									X	X	X	X	X							
Unit 7: Geometry																													X	X	X					
Unit 8: Statistics and Probability																																	X	X	X	
Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Month	Sept				Oct				Nov				Dec				Jan				Feb/March				March/April				April/May				June			

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 1 - Number System
Time Frame	6 weeks (see pacing guide)
Anchor Standards/Domain*	
<u>Anchor Standards for Mathematics</u> <ul style="list-style-type: none"> 6.NS.A Apply and extend previous understandings of multiplication and division to divide fractions by fractions. 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples. 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers. 	
<u>New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills</u> <u>9.4 Life Literacies, and Key Skills</u> <i>Technology Literacy</i> <ul style="list-style-type: none"> Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. 	
<u>WIDA Standards</u> <ul style="list-style-type: none"> ELD Standard 1: Social and Instructional Language ELD Standard 3: The Language of Mathematics 	
Unit Summary	
<p>Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular, negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.</p>	
Standard Number(s)	
<p>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. <i>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, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-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.?</i></p> <p>6.NS.B.2. Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.B.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p>	

6.NS.B.4. 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. *For example, express $36 + 8$ as $4(9 + 2)$.*

6.NS.C.5. 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.

6.NS.C.6. 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.

- 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.
- 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.
- 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.

6.NS.C.7. Understand ordering and absolute value of rational numbers.

- Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.*
- Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .*
- 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. *For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.*
- Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*

6.NS.C.8. 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.

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem

Essential Question(s)

- In what ways could you model multiplication and division of fractions?
- What does it mean to multiply and divide fractions?

- How are division and multiplication of a fraction by a fraction related?
- Why would one need to find common factors and multiples?
- In what ways can rational numbers be useful?
- When is the absolute value of a rational number used in real life?

Enduring Understandings – Students will understand that...

- Multiplication of fractions involves taking a part of a part.
- Division of fractions involves the inverse of multiplication.
- Difference between factors and multiples.
- A rational number is a point on a number line.
- Rational numbers have an order that exists related to their location on a number line.

Interdisciplinary Connections

- Topic “STEM Project”
- Topic “3 ACT Math”
- Understanding that positive and negative numbers are used together to describe quantities having opposite directions or values, being able to use positive and negative numbers to represent quantities in real-world contexts, and explaining the meaning of 0 in each situation will allow students to be successful in the following science standards:
 - MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
 - MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
 - MS-PS2-1. Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.

In this unit plan, the following 21st Century themes and skills are addressed.

Check all that apply. 21 st Century Themes		Check all that apply. 21 st Century Skills	
<input type="checkbox"/>	Global Awareness	<input checked="" type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input checked="" type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input checked="" type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- That multiplication with fractions represents part of a part.
- That division of a fraction by a proper fraction creates a larger answer.
- That multiplication of a fraction by a proper fraction creates a smaller answer.
- How to compute quotients of fractions.
- How to solve word problems involving division of fractions.

- The standard algorithms for addition, subtraction, and multiplication, and division of multi-digit decimals.
- The definitions of factors and multiples.
- The process of finding factors and multiples.
- How to find prime factorization of a number.
- How to find the greatest common factor of two whole numbers less than or equal to one hundred.
- How to find the least common multiple of two whole numbers less than or equal to twelve.
- How to use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of the sum of two whole numbers with no common factor. *For example, express $36 + 8$ as $4(9 + 2)$.*
- That opposite signs of numbers indicate locations on opposite sides of zero on the number line.
- That the signs of numbers in ordered pairs indicate locations in quadrants of the coordinate plane.
- That when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
- How to find the absolute value of a rational number.
- How to use positive and negative numbers to represent quantities in real world contexts.
- How to explain the meaning of zero in situations using positive and negative numbers.
- How to find and position integers and other rational numbers on a horizontal or vertical number line diagram.
- How to interpret absolute value as magnitude for a positive or negative quantity in a real world situation. *For example, for an account balance of $-\$30$, write $|-30| = 30$ to describe the size of the debt in dollars.*
- How to distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than $-\$30$ represents a debt greater than $\$30$.*
- How to solve real world and mathematical problems by graphing points in all four quadrants in the coordinate plane.
- How to find distances between points with the same first coordinate or the same second coordinate, using coordinates and absolute value.

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

Assessments (some can be in more than one category):

- *Pre-Assessment:* Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities
- *Formative:* “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic
- *Summative:* Topics 1 and 2 Assessments
- *Benchmark:* *District mid-year benchmark assessment
- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher’s Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, Topic 1 Review
- Lessons 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, Topic 2 Review
- Lessons 3-2, 7-4
- “3-Act Math” activities
- STEM projects
- “Solve & Discuss It”/“Explore It!”/“Explain It!” activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason

	<ul style="list-style-type: none"> ○ Demonstrate creativity and innovation ○ Utilize critical thinking to make sense of problems and persevere in solving them ○ Use digital tools to enhance their group response ○ Utilize digital tools to present their work to the class, where appropriate ● Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity ● http://www.math-play.com/soccer-math-multiplying-fractions-game/multiplying-fractions-game.html ● http://www.math-play.com/soccer-math-dividing-fractions-game/soccer-math-dividing-fractions-game.html ● http://www.math-play.com/math-basketball-dividing-fractions-game/math-basketball-dividing-fractions-game.html ● http://www.math-play.com/Fractions-Jeopardy/fractions-jeopardy.html ● http://www.math-play.com/adding-and-subtracting-fractions-game.html
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> ● Teacher will introduce fractions as equal parts of a whole. ● Students will make fraction strips by folding strips of paper into fractional parts of equal size. As the students are folding the strips, they will think about the strategies to make different fraction strips. ● Students will make fraction strips for halves, fourths, and eighths. This will lead to understanding of fraction multiplication and equivalent fractions. ● enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games ● Online enVision resources for student assistance/differentiation: Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities, digital tools, digital extra practice, interactive eText, glossary, games ● Math Diagnosis and Intervention System ● English Language Learners Toolkit ● Differentiation Strategies for Special Education Students ● Differentiation Strategies for Gifted and Talented Students ● Differentiation Strategies for ELL Students ● Differentiation Strategies for At Risk Students ● Differentiation Strategies for Students with a 504
Resources	
<ul style="list-style-type: none"> ● enVision 2.0 Topics 1 and 2 ● Communicators, graph boards, calculators ● Graph paper, colored pencils, rulers, 3-D manipulatives ● Projection System, Document Camera, Chromebooks, other student devices ● Websites <ul style="list-style-type: none"> ○ http://nlvm.usu.edu/en/nav/vlibrary.html ○ http://illuminations.nctm.org ○ http://map.mathshell.org/materials/index.php ○ www.IXL.com ○ http://insidemathematics.org 	

- o <http://mathsnacks.com>
- o www.openmiddle.com
- o <https://nysed-prod.engageny.org/>

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 2 - The Number System continued
Time Frame	2 weeks (see pacing guide)

Anchor Standards/Domain

Anchor Standards for Mathematics

- 7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

9.4 Life Literacies, and Key Skills

Technology Literacy

- Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

WIDA Standards

- ELD Standard 1: Social and Instructional Language
- ELD Standard 3: The Language of Mathematics

Unit Summary

In this unit, students develop a unified understanding of a number, recognizing fractions, decimals, and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers. Students use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

Standard Number(s)

7.NS.A.1 - Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*

b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

d. Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.A.2 - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

- b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts.
- c. Apply properties of operations as strategies to multiply and divide rational numbers.
- d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NS.A.3 - Solve real-world and mathematical problems involving the four operations with rational numbers.

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem

Essential Question(s)

- How can one use a number line to order rational numbers?
- Why does one need rational numbers?
- How are adding and subtracting integers related?
- How are an integer and its absolute value related?
- Is the sum of 2 integers positive, negative, or zero?
- Is the product of two integers positive, negative, or zero? How can one tell?
- In what real world contexts would negative numbers be used?

Enduring Understandings

- Rational numbers can be represented in multiple ways and are useful when examining situations involving numbers that are not whole.
- By applying the properties of rational numbers and by viewing negative numbers in terms of everyday contexts, students explain and interpret the rules for adding, subtracting, multiplying and dividing with negative numbers.

Interdisciplinary Connections

- Topic “STEM Project”
- Topic “3 ACT Math”
- MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
Understanding of positive and negative numbers and 0 to describe and represent quantities will allow students to be successful in this science standard.
- MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Understanding of positive and negative numbers and 0 to describe and represent quantities will allow students to be successful in this science standard.

In this unit plan, the following 21st Century themes and skills are addressed.

Check all that apply. 21 st Century Themes		Check all that apply. 21 st Century Skills	
<input type="checkbox"/>	Global Awareness	<input checked="" type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input checked="" type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input checked="" type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- How to describe real-world situations where opposite quantities have a sum of zero.
- How to use a number line or positive/negative chips to show that an integer and its opposite will always have a sum of zero.
- How to use a number line to show addition as a specific distance from a particular number in one direction or the other, depending on the sign of the value being added.
- How to rewrite a subtraction problem as an addition problem by using the additive inverse.
- How to show that the distance between two integers on a number line is the absolute value of their difference.
- How to describe real-world situations represented by the addition, subtraction, multiplication, and division of integers and rational numbers.
- The use of the properties of operations to add and subtract rational numbers.
- The use of patterns and properties to explore and develop procedures for the multiplication of integers.
- The use of the relationship between multiplication and division to develop procedures for dividing integers.
- How to interpret the quotient in relation to the original problem.
- How to generalize the procedures for multiplying and dividing integers to all rational numbers.
- The use of long division to convert a rational number to a decimal.
- How to verify that a number is rational based on its decimal equivalent.

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

Assessments (some can be in more than one category):

- *Pre-Assessment:* Beginning-of-the-Year Assessment, Topic Readiness Assessments, "Review What You Know" activities at the beginning of a new topic, classroom warm-up activities
- *Formative:* "Try It!," "Convince Me!," "Do You Understand?," and "Do You Know How?" activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic
- *Summative:* Topics 1 Assessment
- *Benchmark:* *District mid-year benchmark assessment

- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher's Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 1-10, Topic 1 Review
- Lessons 8-8, 8-9, Topic 8 Review
- "3-Act Math" activities
- STEM projects
- "Solve & Discuss It"/"Explore It!"/"Explain It!" activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason
 - Demonstrate creativity and innovation
 - Utilize critical thinking to make sense of problems and persevere in solving them
 - Use digital tools to enhance their group response
 - Utilize digital tools to present their work to the class, where appropriate
- Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity
- Equivalent fractions approach to non-repeating decimal
<https://tasks.illustrativemathematics.org/content-standards/7/NS/A/2/tasks/604>
- Repeating decimal as approximation
<https://tasks.illustrativemathematics.org/content-standards/7/NS/A/2/tasks/593>
- Sharing Prize Money
<https://tasks.illustrativemathematics.org/content-standards/7/NS/A/3/tasks/298>

Differentiation Strategies

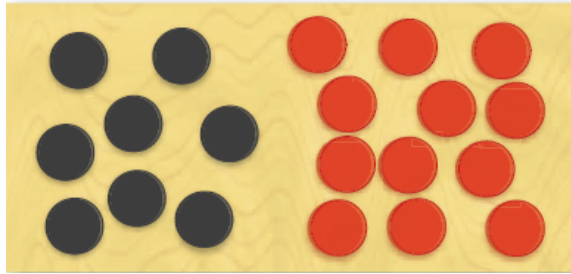
- enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games
- Online enVision resources: (Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities)
- Online enVision resources for student assistance/differentiation: digital tools, extra practice, interactive eText, glossary, games
- Math Diagnosis and Intervention System
- English Language Learners Toolkit
- [Differentiation Strategies for Special Education Students](#)
- [Differentiation Strategies for Gifted and Talented Students](#)
- [Differentiation Strategies for ELL Students](#)
- [Differentiation Strategies for At Risk Students](#)
- [Differentiation Strategies for Students with a 504](#)

Introducing Addition of Integers

- Introduce Chips: 1 red = -1
1 black = +1

1 red + 1 black = 0 (zero pair)

- Students will use the chips to model number sentences. They will use what they know about the chips and a zero pair to determine the answer to each question.
- Example: $+8 + -12$



- Students can make 8 zero pairs (1 red and 1 black), leaving only red colored chips on their board. They can then determine that $+8 + -12 = -4$ or 4 red chips.

Resources

- enVision 2.0 Math Topic 1
- Communicators, graph boards, calculators
- Graph paper, colored pencils, rulers, 3-D manipulatives
- Projection System, Document Camera, Chromebooks, other student devices
- Websites
 - <http://nlvm.usu.edu/en/nav/vlibrary.html>
 - <http://illuminations.nctm.org>
 - <http://map.mathshell.org/materials/index.php>
 - www.IXL.com
 - <http://insidemathematics.org>
 - <http://mathsnacks.com>
 - www.openmiddle.com
 - <https://nysed-prod.engageny.org/>

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 3 - Ratios and Proportional Relationships
Time Frame	6 weeks (see pacing guide)
Anchor Standards/Domain*	
<p><u>Anchor Standards for Mathematics</u></p> <ul style="list-style-type: none"> 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems. <p><u>New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills</u></p> <p><u>9.4 Life Literacies, and Key Skills</u></p> <p><i>Technology Literacy</i></p> <ul style="list-style-type: none"> Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. <p><u>WIDA Standards</u></p> <ul style="list-style-type: none"> ELD Standard 1: Social and Instructional Language ELD Standard 3: The Language of Mathematics 	
Unit Summary	
<p>Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from and extending pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus, students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.</p>	
Standard Number(s)	
<p>6.RP.A.1. 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.” “For every vote candidate A received, candidate C received nearly three votes.”</i></p> <p>6.RP.A.2. 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 $3/4$ cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”</i></p> <p>6.RP.A.3. 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.</p> <p>a. 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. Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, 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?</i></p> <p>c. 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>	

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem

Essential Question(s)

- How can ratios and proportional relationships be used to determine unknown quantities?
- When does one need to use ratios to compare numbers?

Enduring Understandings – Students will understand that...

- Ratios compare two values.
- Unit rates are a/b given that the ratio $a:b$, such that b does not equal zero.

Interdisciplinary Connections

- Topic “STEM Project”
- Topic “3 ACT Math”
- Understanding the concept of a ratio and using ratio language to describe a ratio relationship between two quantities will allow students to be successful in the following science standards:
 - MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
 - MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
 - MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.
 - MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.
 - MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.
 - MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
 - MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

- o MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- Using ratio and rate reasoning to solve real-world and mathematical problems will allow students to be successful in the following science standards:
 - o MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
 - o MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.
 - o MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
 - o MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
 - o MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

In this unit plan, the following 21st Century themes and skills are addressed.

Check all that apply. 21 st Century Themes		Check all that apply. 21 st Century Skills	
<input type="checkbox"/>	Global Awareness	<input checked="" type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input checked="" type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input checked="" type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Ratio language (the ratio of $a:b$ means that there is a of something for every b of a corresponding item).
- a/b is the same as $a:b$ or a to b .
- How to relate a percent of a quantity to a rate per one hundred.
- How to use ratio language to describe a ratio relationship between two quantities.
- How to use rate language in the context of a ratio relationship.
- How to use ratio and rate reasoning to solve real world and mathematical problems.
- How to make a table of equivalent ratios relating quantities with whole number measurements.
- How to solve unit rate problems including those involving unit pricing and constant rate.
- How to find a percent of a quantity as a rate per one hundred and solve problems involving finding the whole, given a part of the percent.
- How to use ratio reasoning to convert measurement units.
- How to manipulate and transform units appropriately when multiplying or dividing quantities.

Assessments (Pre, Formative, Summative, Other)

Denote required common assessments with an *

Assessments (some can be in more than one category):

- *Pre-Assessment:* Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities
- *Formative:* “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities,

homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic

- *Summative*: Topics 3 and 4 Assessments
- *Benchmark*: *District mid-year benchmark assessment
- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher's Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10, Topic 5 Review
- Lessons 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, Topic 6 Review
- "3-Act Math" activities
- STEM projects
- "Solve & Discuss It"/"Explore It!"/"Explain It!" activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason
 - Demonstrate creativity and innovation
 - Utilize critical thinking to make sense of problems and persevere in solving them
 - Use digital tools to enhance their group response
 - Utilize digital tools to present their work to the class, where appropriate
- Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity
- Ratio review http://www.aaamath.com/B/g62a_rx1.htm#section2
- Ratio practice & quiz http://www.aaamath.com/B/g62b_fx1.htm#section2
- Dirt bike fractions
<http://www.arcademicskillbuilders.com/games/dirt-bike-proportions/dirt-bike-proportions.html>
- Percent with a calculator
http://www.themathpage.com/ARITH/Ar_Pr/key_1.htm
- Ratio blasters
<http://www.arcademicskillbuilders.com/games/ratio-blaster/ratio-blaster.html>
- Proportion practice
<http://www.math.com/school/subject1/practice/S1u2L2/S1U2L2Pract.html>
- Ratio video
<http://www.learnalberta.ca/content/mesg/html/math6web/index.html?page=lessons&lesson=m6lessonshell03.swf>
- Khan academy
<https://www.khanacademy.org/test-prep/praxis-math/praxis-math-lessons/praxis-math-number-and-quantity/a/gtp--praxis-math--article--ratios-and-proportions--lesson>
- Optimizing: Security Cameras
<http://map.mathshell.org/materials/lessons.php?taskid=482#task482>
- Sharing Costs: Traveling to School
<http://map.mathshell.org/materials/lessons.php?taskid=489#task489>

Differentiation Strategies

- enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games

- Online enVision resources for student assistance/differentiation: Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities, digital tools, digital extra practice, interactive eText, glossary, games
- Math Diagnosis and Intervention System
- English Language Learners Toolkit
- [Differentiation Strategies for Special Education Students](#)
- [Differentiation Strategies for Gifted and Talented Students](#)
- [Differentiation Strategies for ELL Students](#)
- [Differentiation Strategies for At Risk Students](#)
- [Differentiation Strategies for Students with a 504](#)

Resources

- enVision 2.0 Topics 5 and 6
- Communicators, graph boards, calculators
- Graph paper, colored pencils, rulers, 3-D manipulatives
- Projection System, Document Camera, Chromebooks, other student devices
- Websites
 - <http://nlvm.usu.edu/en/nav/vlibrary.html>
 - <http://illuminations.nctm.org>
 - <http://map.mathshell.org/materials/index.php>
 - www.IXL.com
 - <http://insidemathematics.org>
 - <http://mathsnacks.com>
 - www.openmiddle.com
 - <https://nysed-prod.engageny.org/>

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 4 - Ratios and Proportional Relationships Continued
Time Frame	2 weeks (see pacing guide)

Anchor Standards/Domain

Anchor Standards for Mathematics

- 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.

New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

9.4 Life Literacies, and Key Skills

Technology Literacy

- Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

WIDA Standards

- ELD Standard 1: Social and Instructional Language
- ELD Standard 3: The Language of Mathematics

Unit Summary

In this unit, students extend their understandings of ratios and develop understanding of proportionality to solve real-life problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including discounts, tax, tips, and percent change. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line.

Standard Number(s)

7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1/2}{1/4}$ miles per hour, equivalently 2 miles per hour.*

7.RP.A.2 Recognize and represent proportional relationships between quantities.

- Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
- Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.*
- Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

7.RP.A.3. Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem.

Essential Question(s)

- How can one extend prior knowledge of unit rates to include rational numbers?
- How can one write a proportion that solves a problem in real life?
- How can one use a graph/table to show the relationship between two variables that vary directly? How can one use an equation?

Enduring Understandings

- Ratios and proportional relationships are used to express how quantities are related and how quantities change in relation to each other.
- Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called slope.
- We can compute unit rates associated with ratios of fractional quantities measured in like or different units.
- The constant of proportionality (unit rate) can be identified in tables, graphs, equations, and verbal descriptions of proportional relationships
- Proportional relationships enable us to solve multi-step percent problems

Interdisciplinary Connections

- Topic "STEM Project"
- Topic "3 ACT Math"
- MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
The understanding of ratio and ratio language to describe relationships between two quantities will allow students to be successful in this science standard.
- Being able to recognize and represent proportional relationships between two quantities will allow students to be successful in the following science standards:
 - MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
 - MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.
 - MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
 - MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

- o MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- o MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- o MS-LS4-6. Use mathematical representation to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
- o MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
- o MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- o MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

In this unit plan, the following 21st Century themes and skills are addressed.

Check all that apply. 21st Century Themes		Check all that apply. 21st Century Skills	
<input type="checkbox"/>	Global Awareness	<input checked="" type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input checked="" type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input checked="" type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- How to compute unit rate by iterating (repeating) or portioning a given rate and multiplying or dividing both quantities by the same factor.
- How to explain the relationship between using composed units and a multiplicative comparison to express a unit rate.
- How to determine whether two quantities are proportional by examining the relationship given in a table, graph, equation, diagram, or verbal description.
- How to identify the constant of proportionality when presented with a proportional relationship in the form of table, graph, equation, diagram, or verbal description.
- How to write an equation that represents a proportional relationship
- How to explain the relevance of a specific point on the graph of a proportional relationship, including but not limited to (0, 0) and (1, r).
- The use of proportional reasoning to solve real-world ratio and percent problems, including those with multiple steps.

Assessments (Pre, Formative, Summative, Other)

Denote required common assessments with an *

Assessments (some can be in more than one category):

- *Pre-Assessment*: Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities
- *Formative*: “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic
- *Summative*: Topics 2 and 3 Assessments
- *Benchmark*: *District mid-year benchmark assessment
- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher’s Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, Topic 2 Review
- Lessons 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, Topic 3 Review
- Lesson 6-2, Topic 6 Review
- Lesson 7-2, Topic 7 Review
- “3-Act Math” activities
- STEM projects
- “Solve & Discuss It”/”Explore It!”/”Explain It!” activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason
 - Demonstrate creativity and innovation
 - Utilize critical thinking to make sense of problems and persevere in solving them
 - Use digital tools to enhance their group response
 - Utilize digital tools to present their work to the class, where appropriate
- Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity
- Increasing and Decreasing Quantities by a Percent
<https://www.map.mathshell.org/lessons.php?unit=7100&collection=8>
- Discounts and Mark-Ups activity
- Proportional Reasoning
<https://www.map.mathshell.org/lessons.php?unit=7215&collection=8>

Differentiation Strategies

- enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games
- Online enVision resources: (Today’s Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities)
- Online enVision resources for student assistance/differentiation: digital tools, extra practice, interactive eText, glossary, games
- Math Diagnosis and Intervention System
- English Language Learners Toolkit
- [Differentiation Strategies for Special Education Students](#)
- [Differentiation Strategies for Gifted and Talented Students](#)
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| | <ul style="list-style-type: none">• Differentiation Strategies for At Risk Students• Differentiation Strategies for Students with a 504 |
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Resources

- enVision 2.0 Math Topics 2 and 3, Lessons 6-2 and 7-2
- Communicators, graph boards, calculators
- Graph paper, colored pencils, rulers, 3-D manipulatives
- Projection System, Document Camera, Chromebooks, other student devices
- Websites
 - <http://nlvm.usu.edu/en/nav/vlibrary.html>
 - <http://illuminations.nctm.org>
 - <http://map.mathshell.org/materials/index.php>
 - www.IXL.com
 - <http://insidemathematics.org>
 - <http://mathsnacks.com>
 - www.openmiddle.com
 - <https://nysed-prod.engageny.org/>

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 5 - Expressions and Equations
Time Frame	6 weeks (see pacing guide)
Anchor Standards/Domain*	
<p><u>Anchor Standards for Mathematics</u></p> <ul style="list-style-type: none"> 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions. 6.EE.B Reason about and solve one-variable equations and inequalities. 6.EE.C Represent and analyze quantitative relationships between dependent and independent variables. <p><u>New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills</u></p> <p><u>9.4 Life Literacies, and Key Skills</u></p> <p><i>Technology Literacy</i></p> <ul style="list-style-type: none"> Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. <p><u>WIDA Standards</u></p> <ul style="list-style-type: none"> ELD Standard 1: Social and Instructional Language ELD Standard 3: The Language of Mathematics 	
Unit Summary	
<p>Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.</p>	
Standard Number(s)	
<p>6.EE.A.1. Write and evaluate numerical expressions involving whole-number exponents.</p> <p>6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.</p> <p>a. Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation "Subtract y from 5" as $5 - y$.</i></p> <p>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 $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.</i></p> <p>c. 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</p>	

conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.*

6.EE.A.3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.*

6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.*

6.EE.B.5. 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.

6.EE.B.6. 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.

6.EE.B.7. 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.

6.EE.B.8. 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.

6.EE.C.9. 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. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.*

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem

Essential Question(s)

- How are mathematical expressions in which letters stand for numbers useful in real life?
- What is the purpose of identifying equivalent expressions?
- How can mathematical expressions and equations be used to model, analyze, and solve mathematical situations?

- What is the difference between an equation and an inequality?
- What does it mean when a number does not satisfy an equation or an inequality?
- How is a relationship represented in tables, graphs, and equations?

Enduring Understandings: Students will understand that...

- Algebraic expressions have letters that stand for numbers and arithmetic expressions have only numbers and no letters.
- Numbers can be substituted in place of letters in algebraic expressions.
- Algebraic expressions can be equivalent to each other.
- Area, perimeter, and volume formulas are algebraic formulas.
- The verbal sentences or expressions can be written as algebraic expressions.
- Solving an equation or an inequality will find the value(s) that will make the statement true.
- A variable can represent an unknown number.
- A variable can represent any number in a specific set.
- The value of one quantity determines the value of the second quantity.
- Two quantities may or may not be related.

Interdisciplinary Connections

- Topic “STEM Project”
- Using variables to represent numbers and write expressions when solving a real-world or mathematical problem and understanding that a variable can represent an unknown number will allow students to be successful in the following science standards:
 - MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
 - MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history.
 - MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales.
 - MS-ESS2-3. Analyze and interpret data on the distributions of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
 - MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth’s mineral, energy, and groundwater resources are the result of past and current geoscience processes.
 - MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
 - MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.
 - MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
 - MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

- o MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- Being able to write an equation to express one quantity in terms of the other and being able to analyze the relationship between dependent and independent variables using graphs and tables will allow students to be successful in the following science standards:
 - o MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
 - o MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
 - o MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
 - o MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
 - o MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- Being able to write, read, and evaluate expressions in which letters stand for numbers will allow students to be successful in the following science standards:
 - o MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
 - o MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

In this unit plan, the following 21st Century themes and skills are addressed.

<i>Check all that apply.</i> 21st Century Themes			<i>Check all that apply.</i> 21st Century Skills		
		Global Awareness		x	Creativity and Innovation
		Environmental Literacy		x	Critical Thinking and Problem Solving
		Health Literacy		x	Communication
		Civic Literacy		x	Collaboration
x		Financial, Economic, Business, and Entrepreneurial Literacy			

Student Learning Targets/Objectives (Students will know/Students will understand)

- The definition of sum, term, product, factor, quotient, coefficient.
- How to identify two algebraic expressions that are equivalent.
- To apply the conventional order of operations when no parentheses are given.
- How to apply the distributive property.
- How to write and evaluate numerical expressions involving whole number exponents.
- How to write and evaluate expressions in which letters stand for numbers.
- That a random number may not make an equation or inequality true.
- That while inequalities may have infinitely many solutions, equations have a finite number of solutions.

- How to use substitution to determine whether a given number in a specified set will make an equation or inequality true.
- How to use variables to represent numbers.
- How to represent solutions of inequalities on number line diagrams.
- The meanings of independent and dependent variables.
- How to analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
- How to use the equation of a relationship between two dependent and independent variables to predict ordered pairs that are not displaced in a given graph or table.

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

Assessments (some can be in more than one category):

- *Pre-Assessment:* Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities
- *Formative:* “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic
- *Summative:* Topics 5 and 6 Assessments
- *Benchmark:* *District mid-year benchmark assessment
- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher’s Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 3-1, 3-3, 3-4, 3-5, 3-6, 3-7 Topic 3 Review
- Lessons 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7 4-8, 4-9, 4-10, Topic 4 Review
- Lessons 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, Topic 7 Review
- “3-Act Math” activities
- STEM projects
- “Solve & Discuss It!”/”Explore It!”/”Explain It!” activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason
 - Demonstrate creativity and innovation
 - Utilize critical thinking to make sense of problems and persevere in solving them
 - Use digital tools to enhance their group response
 - Utilize digital tools to present their work to the class, where appropriate
- Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity
- Laws of Arithmetic
<http://map.mathshell.org/materials/lessons.php?taskid=484#task484>

Differentiation Strategies

- enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games

- Online enVision resources for student assistance/differentiation: Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities, digital tools, digital extra practice, interactive eText, glossary, games
- Math Diagnosis and Intervention System
- English Language Learners Toolkit
- [Differentiation Strategies for Special Education Students](#)
- [Differentiation Strategies for Gifted and Talented Students](#)
- [Differentiation Strategies for ELL Students](#)
- [Differentiation Strategies for At Risk Students](#)
- [Differentiation Strategies for Students with a 504](#)

Resources

- enVision 2.0 Topics 3, 4, and 7
- Communicators, graph boards, calculators
- Graph paper, colored pencils, rulers, 3-D manipulatives
- Projection System, Document Camera, Chromebooks, other student devices
- Websites
 - <http://nlvm.usu.edu/en/nav/vlibrary.html>
 - <http://illuminations.nctm.org>
 - <http://map.mathshell.org/materials/index.php>
 - www.IXL.com
 - <http://insidemathematics.org>
 - <http://mathsnacks.com>
 - www.openmiddle.com
 - <https://nysed-prod.engageny.org/>

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 6-Expressions and Equations Continued
Time Frame	5 weeks (see pacing guide)

Anchor Standards/Domain

Anchor Standards for Mathematics

- 7.EE.A Use properties of operations to generate equivalent expressions.
- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

9.4 Life Literacies, and Key Skills

Technology Literacy

- Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

WIDA Standards

- ELD Standard 1: Social and Instructional Language
- ELD Standard 3: The Language of Mathematics

Unit Summary

Students use arithmetic of rational numbers as they develop expressions and equations using variables. They represent real-world situations using equations and inequalities. They use these equations and inequalities to solve problems by reasoning about the quantities.

Standard Number(s)

7.EE.A.1 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.A.2 - 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. *For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."*

7.EE.B.3 - Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*

7.EE.B.4 - Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.*

Mathematical Practices 1-8:

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

Technology Standards:

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem.

Essential Question(s)

- How can algebraic expressions and equations be used to model, analyze, and solve mathematical situations?
- Why would one need to find equivalent forms of an expression?
- What real world problems could be represented by equations?
- What real world problems could be represented by inequalities?

Enduring Understandings

- Students will understand that rewriting an expression in different forms in a problem context can clarify the problem.
- Students will understand that rewriting an expression can clarify how the quantities in the problem are related.
- Students will understand algebraic expressions and equations are used to model real-life problems.
- Students will understand algebraic expressions and equations are used to represent quantitative relationships, so that the numbers and symbols can be mindfully manipulated to reach a solution or make sense of the quantitative relationships.

Interdisciplinary Connections

- Topic "STEM Project"
- Topic "3 ACT Math"
- Being able to use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities will allow students to be successful in the following science standards:
 - MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
 - MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

- o MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- o MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
- o MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- o MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- o MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- o MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- o MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- o MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
- o MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- Being able to solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), being able to use tools strategically, being able to apply properties of operations to calculate with numbers, being able to convert between forms as appropriate, and being able to assess the reasonableness of answers using mental computation and estimation strategies will allow students to be successful in the following science standards:
 - o MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - o MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - o MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

In this unit plan, the following 21st Century themes and skills are addressed.

<i>Check all that apply.</i> 21st Century Themes			<i>Check all that apply.</i> 21st Century Skills		
	<input type="checkbox"/>	Global Awareness		<input checked="" type="checkbox"/>	Creativity and Innovation
	<input type="checkbox"/>	Environmental Literacy		<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
	<input type="checkbox"/>	Health Literacy		<input checked="" type="checkbox"/>	Communication
	<input type="checkbox"/>	Civic Literacy		<input checked="" type="checkbox"/>	Collaboration
	<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy			

Student Learning Targets/Objectives (Students will know/Students will understand)	
<ul style="list-style-type: none"> • The use of the commutative and associative properties to add linear expressions with rational coefficients. • The use of the distributive property to add and/or subtract linear expressions with rational coefficients. • The use of the distributive property to factor a linear expression with rational coefficients. • The use of the distributive property to expand a linear expression with rational coefficients. • The use of equivalent expressions to understand the relationships between quantities. • How to solve real-world problems using rational numbers in any form, including those problems involving multiple steps. • How to apply the properties of operations to fluently compute with rational numbers in any form. • The use of mental math and estimation strategies to determine if a solution is reasonable. • The use of a variable to represent an unknown quantity and write a simple algebraic equation to represent a real world problem. • How to solve a simple algebraic equation by using the properties of equality or mathematical reasoning, and show or explain my steps. • How to compare an arithmetic solution to an algebraic solution. • How to write and solve a simple algebraic inequality and graph the solution on a number line to represent a real-world problem and describe the solution to an inequality in relation to the problem. 	
Assessments (Pre, Formative, Summative, Other)	Denote required common assessments with an *
<p>Assessments (some can be in more than one category):</p> <ul style="list-style-type: none"> • <i>Pre-Assessment:</i> Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities • <i>Formative:</i> “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic • <i>Summative:</i> Topic 4 and 5 Assessments • <i>Benchmark:</i> *District mid-year benchmark assessment • <i>Alternative</i> (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher’s Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work 	
Teaching and Learning Activities	
Activities	<ul style="list-style-type: none"> • Lessons 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, Topic 4 Review • Lessons 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, Topic 5 Review • Lessons 1-10, 4-1, 6-2, 7-1, 7-4, 8-5, 8-6, 8-8, 8-9 • “3-Act Math” activities • STEM projects • “Solve & Discuss It”/”Explore It!”/”Explain It!” activities at the beginning of each lesson - students should be encouraged to: <ul style="list-style-type: none"> ○ Work productively in teams ○ Communicate clearly and effectively and with reason ○ Demonstrate creativity and innovation ○ Utilize critical thinking to make sense of problems and persevere in solving them ○ Use digital tools to enhance their group response ○ Utilize digital tools to present their work to the class, where appropriate

	<ul style="list-style-type: none"> ● Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity ● www.illustrativemathematics.org: Writing Expressions, Miles to kilometers, Guess My Number, Discounted Books, Fishing Adventure 2, Sports Equipment Set ● https://illuminations.nctm.org/Default.aspx: Pan Balance- Numbers, Pan Balance- Expressions, Algebra Tiles
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> ● enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games ● Online enVision resources: (Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities) ● Online enVision resources for student assistance/differentiation: digital tools, extra practice, interactive eText, glossary, games ● Math Diagnosis and Intervention System ● English Language Learners Toolkit ● Differentiation Strategies for Special Education Students ● Differentiation Strategies for Gifted and Talented Students ● Differentiation Strategies for ELL Students ● Differentiation Strategies for At Risk Students ● Differentiation Strategies for Students with a 504
Resources	
<ul style="list-style-type: none"> ● enVision 2.0 Math Topics 4 and 5 ● Communicators, graph boards, calculators ● Graph paper, colored pencils, rulers, 3-D manipulatives ● Projection System, Document Camera, Chromebooks, other student devices ● Websites <ul style="list-style-type: none"> ○ http://nlvm.usu.edu/en/nav/vlibrary.html ○ http://illuminations.nctm.org ○ http://map.mathshell.org/materials/index.php ○ www.IXL.com ○ http://insidemathematics.org ○ http://mathsnacks.com ○ www.openmiddle.com ○ https://nysed-prod.engageny.org/ 	

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 7 - Geometry
Time Frame	3 weeks (see pacing guide)
Anchor Standards/Domain*	
<p><u>Anchor Standards for Mathematics</u></p> <ul style="list-style-type: none"> 6.G.A Solve real world and mathematical problems involving area, surface area, and volume. <p><u>New Jersey Student Learning Standards for Computer Science and Design Thinking</u></p> <p><u>8.2 Design Thinking</u></p> <p><i>Engineering Design</i></p> <ul style="list-style-type: none"> Engineering design is a systematic, creative, and iterative process used to address local and global problems. The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes. <p><u>New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills</u></p> <p><u>9.4 Life Literacies, and Key Skills</u></p> <p><i>Technology Literacy</i></p> <ul style="list-style-type: none"> Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. <p><u>WIDA Standards</u></p> <ul style="list-style-type: none"> ELD Standard 1: Social and Instructional Language ELD Standard 3: The Language of Mathematics 	
Unit Summary	
<p>Students will build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.</p>	
Standard Number(s)	
<p>6.G.A.1. 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.</p> <p>6.G.A.2. 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</p>	

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.

6.G.A.3. 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.

6.G.A.4. Represent three-dimensional figures 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.

Mathematical Practices 1-8:

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

New Jersey Student Learning Standards for Computer Science and Design Thinking

- 8.2.8.ED.1 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.

New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

- 9.4.8.TL.2 Gather data and digitally represent information to communicate a real-world problem.

Essential Question(s)

- How are areas of polygons found?
- Why would one want to calculate areas of polygons?
- How are volume and surface area of a right rectangular prism found?
- Why are volumes represented in cubic units?
- What is the connection between the net and surface area of 3-D figures?

Enduring Understandings – Students will understand that...

- Triangles and rectangles can be used to find areas of other polygons.
- A 2-D net of a 3-D figure can be used to find the surface area of the figure.
- Surface area is related to “wrapping” or “covering” of a surface with square units, i.e. squares with side lengths of one unit.
- Volume is related to “filling” of space with cubic units, i.e. cubes with edges of one-unit length.

Interdisciplinary Connections

- Topic “STEM Project”
- Topic “3 ACT Math”

In this unit plan, the following 21 st Century themes and skills are addressed.					
Check all that apply. 21 st Century Themes			Check all that apply. 21 st Century Skills		
		Global Awareness		<input checked="" type="checkbox"/>	Creativity and Innovation
		Environmental Literacy		<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
		Health Literacy		<input checked="" type="checkbox"/>	Communication
		Civic Literacy		<input checked="" type="checkbox"/>	Collaboration
	<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy			
Student Learning Targets/Objectives (Students will know/Students will understand)					
<ul style="list-style-type: none">• That the area of triangles, including right triangles, and rectangles can be used to find areas of other polygons, when the other polygons are decomposed into triangles or composed into rectangles.• That the volume of a right rectangular prism is the number of unit cubes it contains (of the appropriate unit fraction edge length).• That the total area of a net of a 3D figure is the surface area of the figure.• How to find the area of right triangles, other triangles, and special quadrilaterals.• How to find the areas of polygons by composing them into rectangles or decomposing them into triangles.• How to represent 3D figures using nets.• How to find the surface area of a 3D figure by finding the total area of its 2D net.					
Assessments (Pre, Formative, Summative, Other)			Denote required common assessments with an *		
Assessments (some can be in more than one category): <ul style="list-style-type: none">• <i>Pre-Assessment</i>: Beginning-of-the-Year Assessment, Topic Readiness Assessments, “Review What You Know” activities at the beginning of a new topic, classroom warm-up activities• <i>Formative</i>: “Try It!,” “Convince Me!,” “Do You Understand?,” and “Do You Know How?” activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic• <i>Summative</i>: Topic 7 Assessment• <i>Benchmark</i>: *District mid-year benchmark assessment• <i>Alternative</i> (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher’s Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work					
Teaching and Learning Activities					
Activities	<ul style="list-style-type: none">• Lessons 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, Topic 7 Review• Lesson 2-6• “3-Act Math” activities• STEM projects• “Solve & Discuss It”/”Explore It!”/”Explain It!” activities at the beginning of each lesson - students should be encouraged to:<ul style="list-style-type: none">○ Work productively in teams○ Communicate clearly and effectively and with reason○ Demonstrate creativity and innovation○ Utilize critical thinking to make sense of problems and persevere in solving them				

	<ul style="list-style-type: none"> ○ Use digital tools to enhance their group response ○ Utilize digital tools to present their work to the class, where appropriate ● Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity ● Design: Candy Cartons http://map.mathshell.org/materials/lessons.php?taskid=488#task488 ● Interactive Volume and Surface Area http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/ ● Khan Academy http://www.khanacademy.org/math/geometry/basic-geometry/volume_tutorial/v/cylinder-volume-and-surface-area
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> ● enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games ● Online enVision resources for student assistance/differentiation: Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities, digital tools, digital extra practice, interactive eText, glossary, games ● Math Diagnosis and Intervention System ● English Language Learners Toolkit ● Differentiation Strategies for Special Education Students ● Differentiation Strategies for Gifted and Talented Students ● Differentiation Strategies for ELL Students ● Differentiation Strategies for At Risk Students ● Differentiation Strategies for Students with a 504
Resources	
<ul style="list-style-type: none"> ● enVision 2.0, Topic 7 ● Communicators, graph boards, calculators ● Graph paper, colored pencils, rulers, 3-D manipulatives ● Projection System, Document Camera, Chromebooks, other student devices ● Websites <ul style="list-style-type: none"> ○ http://nlvm.usu.edu/en/nav/vlibrary.html ○ http://illuminations.nctm.org ○ http://map.mathshell.org/materials/index.php ○ www.IXL.com ○ http://insidemathematics.org ○ http://mathsnacks.com ○ www.openmiddle.com ○ https://nysed-prod.engageny.org/ 	

Wayne Township Public Schools
Grade 6 1A Mathematics Curriculum

Content Area/ Grade Level/ Course:	Mathematics Grade 6 1A
Unit Plan Title:	Unit 8 - Statistics and Probability
Time Frame	3 weeks (see pacing guide)
Anchor Standards/Domain* Statistics and Probability	
<p><u>Anchor Standards for Mathematics</u></p> <ul style="list-style-type: none"> • 6.SP.A Develop understanding of statistical variability. • 6.SP.B Summarize and describe distributions. <p><u>New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills</u></p> <p><u>9.1 Personal Financial Literacy</u></p> <p><i>Financial Psychology</i></p> <ul style="list-style-type: none"> • Marketing techniques are designed to encourage individuals to purchase items they may not need or want. <p><u>9.4 Life Literacies, and Key Skills</u></p> <p><i>Technology Literacy</i></p> <ul style="list-style-type: none"> • Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. <p><u>WIDA Standards</u></p> <ul style="list-style-type: none"> • ELD Standard 1: Social and Instructional Language • ELD Standard 3: The Language of Mathematics 	
Unit Summary	
<p>Building on and reinforcing their understanding of numbers, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.</p>	
Standard Number(s)	
<p>6.SP.A.1. 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></p> <p>6.SP.A.2. 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.</p> <p>6.SP.A.3. 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.</p>	

6.SP.B.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.B.5. Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- c. 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.
- d. 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.

Mathematical Practices 1-8:

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

New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

- 9.1.8.FP.7 Identify the techniques and effects of deceptive advertising.
- 9.4.8.TL.6 Collaborate to develop and publish work that provides perspectives on a real-world problem.

Essential Question(s)

- What is a statistical question?
- What is a distribution?
- How is probability used to make an informed decision about uncertain events?
- How are data sets described?
- How do measures of center and variability help us make sense of the world around us?
- Why do we need multiple ways of describing numerical data?

Enduring Understandings – Students will understand that...

- Numerical data can be displayed in multiple ways.
- Summaries of numerical data vary based on their contexts.
- Overall patterns of numerical data can vary.
- Some patterns of numerical data can have striking deviations.

Interdisciplinary Connections

- Topic “STEM Project”
- Topic “3 ACT Math”

- Understanding 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 and being able to summarize numerical data sets in relation to their context will allow students to be successful in the following science standards:
 - MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
 - MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- Being able to summarize numerical data sets in relation to their context will allow students to be successful in the following science standards:
 - MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
 - MS-LS3-2. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
 - MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individual's probability of surviving and reproducing in a specific environment.
 - MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
 - MS-PS3-4.
- Being able to display numerical data in plots on a number line, including dot plots, histograms, and box plots will allow students to be successful in the following science standards:
 - MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

In this unit plan, the following 21st Century themes and skills are addressed.

Check all that apply. 21 st Century Themes			Check all that apply. 21 st Century Skills		
	<input type="checkbox"/>	Global Awareness		<input checked="" type="checkbox"/>	Creativity and Innovation
	<input type="checkbox"/>	Environmental Literacy		<input checked="" type="checkbox"/>	Critical Thinking and Problem Solving
	<input type="checkbox"/>	Health Literacy		<input checked="" type="checkbox"/>	Communication
	<input type="checkbox"/>	Civic Literacy		<input checked="" type="checkbox"/>	Collaboration
X	<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy			

Student Learning Targets/Objectives (Students will know/Students will understand)

- That a set of data can be described by its center, spread, and overall shape.
- How to find the center of a numerical data set.
- That the center summarizes a data set with a single number.
- That the spread is a measure of variation of all values in a data set about the center.
- How to recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. 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.

- 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.
- 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.
- How to display numerical data using dot plots, histograms, and box plots.
- How to summarize numerical data in multiple ways.
- How to identify a striking deviation from the overall pattern.
- Real life examples of patterns with and without striking deviations.
- How to construct dot plots, histograms, and box plots.

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

Assessments (some can be in more than one category):

- *Pre-Assessment:* Beginning-of-the-Year Assessment, Topic Readiness Assessments, "Review What You Know" activities at the beginning of a new topic, classroom warm-up activities
- *Formative:* "Try It!," "Convince Me!," "Do You Understand?," and "Do You Know How?" activities throughout a topic, lesson quizzes, Mid-Topic Checkpoints, informal student questioning, communicator activities, homework, class participation, exit cards/tickets, use of digital assessment tools through, Chromebooks, smart phones, or other devices, Edulastic
- *Summative:* Topics 8 Assessment
- *Benchmark:* *District mid-year benchmark assessment
- *Alternative* (available for individual students as needed): Topic Performance Tasks, Student Self-Assessment Tool (Teacher's Resource Masters, Volume 2), evaluate student work using the Cognitive Rigor Matrix for Mathematics (Assessment Book), portfolio assessment of student work

Teaching and Learning Activities

Activities

- Lessons 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, Topic 8 Review
- "3-Act Math" activities
- STEM projects
- "Solve & Discuss It"/"Explore It!"/"Explain It!" activities at the beginning of each lesson - students should be encouraged to:
 - Work productively in teams
 - Communicate clearly and effectively and with reason
 - Demonstrate creativity and innovation
 - Utilize critical thinking to make sense of problems and persevere in solving them
 - Use digital tools to enhance their group response
 - Utilize digital tools to present their work to the class, where appropriate
- Ongoing use of NJSLA online tools, NJSLA online calculator, and reference sheet to gain comfort and familiarity
- Grade 6 Project - Advertisement and Marketing
 - Students will be provided with a brief overview of marketing techniques.
 - Students will choose a product that interests them, research facts about the project, and look for advertisements for the product.
 - Students will analyze the marketing techniques and summarize their findings using a digital tool to present to classmates.

	<ul style="list-style-type: none"> • Mean, Median, Mode and Range http://map.mathshell.org/materials/lessons.php?taskid=486#task486 • Mean, Median, Mode http://www.kidsmathgamesonline.com/numbers/meanmedianmode.html
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> • enVision Differentiated Intervention: Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment, Math Tools and Games • Online enVision resources for student assistance/differentiation: Today's Challenge, accessible student edition of text, Another Look activities and videos, reteaching activities, digital tools, digital extra practice, interactive eText, glossary, games • Math Diagnosis and Intervention System • English Language Learners Toolkit • Differentiation Strategies for Special Education Students • Differentiation Strategies for Gifted and Talented Students • Differentiation Strategies for ELL Students • Differentiation Strategies for At Risk Students • Differentiation Strategies for Students with a 504
Resources	
<ul style="list-style-type: none"> • enVision 2.0, Topic 8 • Communicators, graph boards, calculators • Graph paper, colored pencils, rulers, 3-D manipulatives • Projection System, Document Camera, Chromebooks, other student devices • Websites <ul style="list-style-type: none"> ○ http://nlvm.usu.edu/en/nav/vlibrary.html ○ http://illuminations.nctm.org ○ http://map.mathshell.org/materials/index.php ○ www.IXL.com ○ http://insidemathematics.org ○ http://mathsnacks.com ○ www.openmiddle.com ○ https://nysed-prod.engageny.org/ 	