WATERBURY PUBLIC SCHOOLS

Moving Forward for Student Success

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

Background

The Waterbury Public Schools Curriculum Framework for Mathematics builds on the Common Core State Standards for Mathematics. The standards in this framework are the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of pre-kindergarten–12 standards in order to help ensure that all students are college and career ready in mathematics no later than the end of high school.

The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practice (NGA) began a multi-state standards development initiative in 2009, the two efforts merged. The standards in this document draw on the most important international models as well as research and input from numerous sources, including state departments of education, scholars, assessment developers, professional organizations, educators from pre-kindergarten through college, and parents, students, and other members of the public. In their design and content, refined through successive drafts and numerous rounds of feedback, the Standards represent a synthesis of the best elements of standards-related work to date and an important advance over that previous work. As specified by CCSSO and NGA, the Standards are (1) research and evidence based, (2) aligned with college and work expectations, (3) rigorous, and (4) internationally benchmarked. A particular standard was included in the document only when the best available evidence indicated that its mastery was essential for college and career readiness in a twenty-first-century, globally competitive society. The standards are intended to be a living work: as new and better evidence emerges, the standards will be revised accordingly.

Waterbury Public Schools Mathematics Department Statement of Philosophy

Waterbury Public Schools provides a rich and rigorous mathematics curriculum that prepares students for rewarding postsecondary experiences. . All courses are carefully aligned to the Common Core State Standards in Mathematics. A rich and rigorous mathematics education is about becoming an effective problem solver. This entails evaluating given information, accessing prior knowledge and intertwining these to move toward a potential solution. Attaining such abilities requires students to become driven, independent, competent and confident in their math abilities. Based on this; the philosophy underscoring the units is that of teaching mathematics for understanding, this philosophy will have tangible benefits for both students and teachers. For students, mathematics should cease to be seen as a set of disjointed facts and rules. Rather, students should come to view mathematics as an interesting, powerful tool that enables them to better understand their world. All students should be able to reason mathematically; thus, activities will have multiple levels so that the able student can go into more depth while a student having trouble can still make sense out of the activity. For teachers, the reward of seeing students excited by mathematical inquiry, a redefined role as guide and facilitator of inquiry, and collaboration with other teachers should result in innovative approaches to instruction, increased enthusiasm for teaching, and a more positive image with students and society. Students exiting the Waterbury Public Schools Mathematics program will understand and be able to solve non-routine problems in nearly any mathematical situation they might encounter in their daily lives. In addition, they will have gained powerful heuristics, vis-à-vis the interconnectedness of mathematical ideas, that they can apply to most new problems typically requiring multiple modes of representation, abstraction, and communication. This knowledge base will serve as a springboard for students to continue in any endeavor they choose, whether it be further mathematical study in high school and college, technical training in some vocation, or the mere appreciation of mathematical patterns they encounter in their future lives. Furthermore, instruction and assignments are designed to aid students in improving their testing skills. An additional goal of the Waterbury Public Schools Department is that all students are prepared for the numerous standardized tests that they will encounter as they progress through high school and beyond. .

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To be sure the goals of the Philosophy are met. The Mathematics Curriculum will be guided by the following ideas **(adapted from the State of Massachusetts Mathematics Framework, 2011):**

Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding.

Students need to understand mathematics deeply and use it effectively. The standards of mathematical practice describe ways in which students increasingly engage with the subject matter as they grow in mathematical maturity and expertise through the elementary, middle, and high school years. To achieve mathematical understanding, students should have a balance of mathematical procedures and conceptual understanding. Students should be actively engaged in doing meaningful mathematics, discussing mathematical ideas, and applying mathematics in interesting, thought-provoking situations. Tasks should be designed to challenge students in multiple ways. Short- and long-term investigations that connect procedures and skills with conceptual understanding are integral components of an effective mathematics program. Activities should build upon curiosity and prior knowledge, and enable students to solve progressively deeper, broader, and more sophisticated problems. Mathematical tasks reflecting sound and significant mathematics should generate active classroom talk, promote the development of conjectures, and lead to an understanding of the necessity for mathematical reasoning.

An effective mathematics program is based on a carefully designed set of content standards that are clear and specific, focused, and articulated over time as a coherent sequence.

The sequence of topics and performances should be based on what is known about how students' mathematical knowledge, skill, and understanding develop over time. Students should be asked to apply their learning and to show their mathematical thinking and understanding by engaging in the first Mathematical Practice, *Making sense of problems and persevere in solving them*. This requires teachers who have a deep knowledge of mathematics as a discipline. Mathematical problem solving is the hallmark of an effective mathematics program. Skill in mathematical problem solving requires practice with a variety of mathematical problems as well as a firm grasp of mathematical techniques and their underlying principles. Armed with this deeper knowledge, the student can then use mathematics in a flexible way to attack various problems and devise different ways of solving any particular problem. Mathematical problem solving calls for reflective thinking, persistence, learning from the ideas of others, and going back over one's own work with a critical eye. Students should construct viable arguments and critique the reasoning of others, they analyze situations and justify their conclusions and are able to communicate them to others and respond to the arguments of others. *(See Mathematical Practice 3, Construct viable arguments and critique reasoning of others.)* Students at all grades can listen or read the arguments of others and decide whether they make sense, and ask questions to clarify or improve the arguments.

Technology is an essential tool that should be used strategically in mathematics education.

Technology enhances the mathematics curriculum in many ways. Tools such as measuring instruments, manipulatives (such as base ten blocks and fraction pieces), scientific and graphing calculators, and computers with appropriate software, if properly used, contribute to a rich learning environment for developing and applying mathematical concepts. However, appropriate use of calculators is essential; calculators should not be used as a replacement for basic understanding and skills. Elementary students should learn how to perform the basic arithmetic operations independent of the use of a calculator. Although the use of a graphing calculator can help middle and secondary students to visualize properties of functions and their graphs, graphing calculators should be used to enhance their understanding and skills rather than replace them. Teachers and students should consider the available tools when presenting or solving a problem. Student should be familiar with tools appropriate for their grade level to be able to make sound decisions about which of these tools would be helpful. *(See Mathematical Practice 5, Use appropriate tools strategically.)*

All students should have a high quality mathematics program that prepares them for college and a career.

All Waterbury students should have high quality mathematics programs that meet the goals and expectations of these standards and address students' individual interests and talents. The standards provide clear signposts along the way to the goal of college and career readiness for all students. The standards provide for a broad range of students, from those requiring tutorial support to those with talent in mathematics. To promote achievement of these standards, teachers should encourage classroom talk, reflection, use of multiple problem solving strategies, and a positive disposition toward mathematics. They should have high expectations for all students. At every level of the education system, teachers should act on the belief that every child should learn challenging mathematics. Teachers and guidance personnel should advise students and parents about why it is important to take advanced courses in mathematics and how this will prepare students for success in college and the workplace.
All students must have the opportunity to learn and meet the same high standards.

An effective mathematics program builds upon and develops students' literacy skills and knowledge.

Supporting the development of students' literacy skills will allow them to deepen their understanding of mathematics concepts and help them determine the meaning of symbols, key terms, and mathematics phrases as well as develop reasoning skills that apply across the disciplines. Mathematics classrooms should make use of a variety of text materials and formats, including textbooks, math journals, contextual math problems, and data presented in a variety of media. Mathematics classrooms should incorporate a variety of written assignments ranging from math journals to formal written proofs. In speaking and listening, teachers should provide students with opportunities for mathematical discourse, to use precise language to convey ideas, to communicate a solution, and support an argument.

Assessment of student learning in mathematics should take many forms to inform instruction and learning.

A comprehensive assessment program is an integral component of an instructional program. It provides students with frequent feedback on their performance, teachers with diagnostic tools for gauging students' depth of understanding of mathematical concepts and skills, parents with information about their children's performance in the context of program goals, and administrators with a means for measuring student achievement. Assessments take a variety of forms, require varying amounts of time, and address different aspects of student learning. Having students "think aloud" or talk through their solutions to problems permits identification of gaps in knowledge and errors in reasoning. By observing students as they work, teachers can gain insight into students' abilities to apply appropriate mathematical concepts and skills, make conjectures, and draw conclusions. Homework, mathematics journals, portfolios, oral performances, and group projects offer additional means for capturing students' thinking, knowledge of mathematics, facility with the language of mathematics, and ability to communicate what they know to others. Tests and quizzes assess knowledge of mathematical facts, operations, concepts, and skills and their efficient application to problem solving. They can also pinpoint areas in need of more practice or teaching. Taken together, the results of these different forms of assessment provide rich profiles of students' achievements in mathematics and serve as the basis for identifying curricula and instructional approaches to best develop their talents. Assessment should also be a major component of the learning process. As students help identify goals for lessons or investigations, they gain greater awareness of what they need to learn and how they will demonstrate that learning. Engaging students in this kind of goal-setting can help them reflect on their own work, understand the standards to which they are held accountable, and take ownership of their learning.

Grade 7 Overview

Ratios and Proportional Relationships (RP)

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

The Number System (NS)

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

Expressions and Equations (EE)

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

Geometry (G)

- Draw, construct and describe geometrical figures and describe the relationships between them.
- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Statistics and Probability (SP)

- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use, and evaluate probability models.

Mathematical Practices (MP)

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.

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In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

(1) Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

(2) Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

(3) Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

(4) Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

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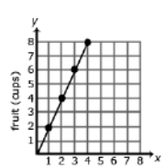
Standards for Mathematical Practice		
Mathematical Practice Standards		***Explanations and Examples***
Mathematically proficient students should be able to:		
7.MP.1. Make sense of problems and persevere in solving them.		In grade 7, students solve problems involving ratios and rates and discuss how they solved them. Students solve real world problems through the application of algebraic and geometric concepts. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?".
7.MP.2. Reason abstractly and quantitatively.		In grade 7, students represent a wide variety of real world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities. Students contextualize to understand the meaning of the number or variable as related to the problem and decontextualize to manipulate symbolic representations by applying properties of operations.
7.MP.3. Construct viable arguments and critique the reasoning of others.		In grade 7, students construct arguments using verbal or written explanations accompanied by expressions, equations, inequalities, models, and graphs, tables, and other data displays (i.e. box plots, dot plots, histograms, etc.). They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students. They pose questions like "How did you get that?", "Why is that true?" "Does that always work?". They explain their thinking to others and respond to others' thinking.
7.MP.4. Model with mathematics.		In grade 7, students model problem situations symbolically, graphically, tabularly, and contextually. Students form expressions, equations, or inequalities from real world contexts and connect symbolic and graphical representations. Students explore covariance and represent two quantities simultaneously. They use measures of center and variability and data displays (i.e. box plots and histograms) to draw inferences, make comparisons and formulate predictions. Students use experiments or simulations to generate data sets and create probability models. Students need many opportunities to connect and explain the connections between the different representations. They should be able to use all of these representations as appropriate to a problem context.
7.MP.5. Use appropriate tools strategically.		Students consider available tools (including estimation and technology) when solving a mathematical problem and decide when certain tools might be helpful. For instance, students in grade 7 may decide to represent similar data sets using dot plots with the same scale to visually compare the center and variability of the data. Students might use physical objects or applets to generate probability data and use graphing calculators or spreadsheets to manage and represent data in different forms.
7.MP.6. Attend to precision.		In grade 7, students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students define variables, specify units of measure, and label axes accurately. Students use appropriate terminology when referring to rates, ratios, probability models, geometric figures, data displays, and components of expressions, equations or inequalities.
7.MP.7. Look for and make use of structure.		Students routinely seek patterns or structures to model and solve problems. For instance, students recognize patterns that exist in ratio tables making connections between the constant of proportionality in a table with the slope of a graph. Students apply properties to generate equivalent expressions (i.e. $6 + 2x = 2\ (3 + x)$ by distributive property) and solve equations (i.e. $2c + 3 = 15$, $2c = 12$ by subtraction property of equality; $c=6$ by division property of equality). Students compose and decompose two- and three-dimensional figures to solve real world problems involving scale drawings, surface area, and volume. Students examine tree diagrams or systematic lists to determine the sample space for compound events and verify that they have listed all possibilities.
7.MP.8. Look for and express regularity in repeated reasoning.		In grade 7, students use repeated reasoning to understand algorithms and make generalizations about patterns. During multiple opportunities to solve and model problems, they may notice that $a/b \div c/d = ad/bc$ and construct other examples and models that confirm their generalization. They extend their thinking to include complex fractions and rational numbers. Students formally begin to make connections between covariance, rates, and representations showing the relationships between quantities. They create, explain, evaluate, and modify probability models to describe simple and compound events.

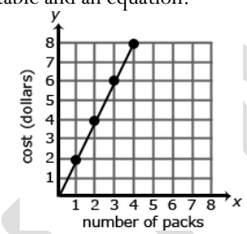
Ratios of Proportional Relationships (RP)

- **Analyze proportional relationships and use them to solve real-world and mathematical problems.**

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **CMT 7.12 B Ratio & Proportions** **CMT 8.12 B Ratio & Proportions** **CMT 8.12 C Ratio & Proportions**	7.MP.2. Reason abstractly and quantitatively 7.MP.6. Attend to precision.	*For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour, equivalently 2 miles per hour.*	Unit 4	**Gr. 7 Big Ideas Math** • Sec 3.1 • Activities 1, 2, & 3 • Lesson 3.1 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti- 73 Calculator Lesson Site: Education.ti.com Smart Shopper
7.RP.2. Recognize and represent proportional relationships between quantities. a. 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. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics.	Students may use a content web site and/or interactive white board to create tables and graphs of proportional or non-proportional relationships. Graphing proportional relationships represented in a table helps students recognize that the graph is a line through the origin (0,0) with a constant of proportionality equal to the slope of the line. Examples: • A student is making trail mix. Create a graph to determine if the quantities of nuts and fruit are proportional for each serving size listed in the table. If the quantities are proportional, what is the constant of proportionality or unit rate that defines the relationship? Explain how you determined the constant of proportionality and how it relates to both the table and graph. **Serving Size** | **1** | **2** | **3** | **4** Cups of Nuts (x) | 1 | 2 | 3 | 4 Cups of Fruit (y) | 2 | 4 | 6 | 8  The relationship is proportional. For each of the other serving sizes there are 2 cups of fruit for every 1 cup of nuts (2:1).	Unit 4	**NCTM Illuminations** Understanding Rational Numbers and Proportions http://illuminations.nctm.org/LessonDetail.aspx?id=L284 **Gr. 7 Big Ideas Math** • Sec 3.2 • Activities 1 & 2 • Lesson 3.2 Slope Changes Everything Unit. Lessons 1 -3 Inc. Investigations **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	**Ti-73 Calculator Lesson** Site: Education.ti.com A Steep Hike

Ratios of Proportional Relationships (RP)

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

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
c. 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 $t = pn$.* d. 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. **CMT/CAPT Assessment Correlation** • **NONE**	7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	The constant of proportionality is shown in the first column of the table and by the slope of the line on the graph. • The graph below represents the cost of gum packs as a unit rate of $2 dollars for every pack of gum. The unit rate is represented as $2/pack. Represent the relationship using a table and an equation.  Table: Number of Packs of Gum (g) / Cost in Dollars (d) 0 / 0 1 / 2 2 / 4 3 / 6 4 / 8 Equation: $d = 2g$, where d is the cost in dollars and g is the packs of gum A common error is to reverse the position of the variables when writing equations. Students may find it useful to use variables specifically related to the quantities rather than using x and y. Constructing verbal models can also be helpful. A student might describe the situation as "the number of packs of gum times the cost for each pack is the total cost in dollars". They can use this verbal model to construct the equation. Students can check their equation by substituting values and comparing their results to the table. The checking process helps student revise and recheck their model as necessary. The number of packs of gum times the cost for each pack is the total cost (g x 2 = d)	Unit 4	**Gr. 7 Big Ideas Math** • Sec 3.3 • Activities 1, 2, & 3 • Lesson 3.3 **Gr. 7 Big Ideas Math** • Sec 3.4 • Activities 1, 2, & 3 • Lesson 3.4 **Gr. 7 Big Ideas Math** • Sec. 3.5 • Activities 1 & 2 • Lesson 3.5 **Gr. 7 Big Ideas Math** • Sec. 3.7b **Boardworks Middle School Math CC PowerPoints**		**Ti-73 Calculator Lesson** Site: Education.ti.com Comparing Rate of Change for Skate Rental

Ratios of Proportional Relationships (RP)

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Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.RP.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.*** ***CMT 7.13 B Comp. w/Percents*** ***CMT 8.12 B Ratio & Proportions*** ***CMT 8.12 C Ratio & Proportions*** ***CMT 8.13 B Comp w/Percents***	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Students should be able to explain or show their work using a representation (numbers, words, pictures, physical objects, or equations) and verify that their answer is reasonable. Models help students to identify the parts of the problem and how the values are related. For percent increase and decrease, students identify the starting value, determine the difference, and compare the difference in the two values to the starting value. Examples: • Gas prices are projected to increase 124% by April 2015. A gallon of gas currently costs $4.17. What is the projected cost of a gallon of gas for April 2015? A student might say: "The original cost of a gallon of gas is $4.17. An increase of 100% means that the cost will double. I will also need to add another 24% to figure out the final projected cost of a gallon of gas. Since 25% of $4.17 is about $1.04, the projected cost of a gallon of gas should be around $9.40." $4.17 + 4.17 + (0.24 • 4.17) = 2.24 x 4.17 • A sweater is marked down 33%. Its original price was $37.50. What is the price of the sweater before sales tax? 37.50 Original Price of Sweater 33% of 37.50 Discount | 67% of 37.50 Sale price of sweater	Unit 4	**Gr. 7 Big Ideas Math** • Sec. 4.1 • Activities 1, 2, 3 & 4 • Lesson 4.1 **Gr. 7 Big Ideas Math** • Sec. 4.2 • Activities 1 & 2 • Lesson 4.2 **Gr. 7 Big Ideas Math** • Sec. 4.3 • Activities 1, 2 & 3 • Lesson 4.3 **Gr. 7 Big Ideas Math** • Sec. 4.4 • Activities 1, 2 & 3 • Lesson 4.4 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**NCTM Illuminations** Who Lost More? **http://illuminations.nctm.org/LessonDetail.aspx?id=L826**

Ratios of Proportional Relationships (RP)

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		The discount is 33% times 37.50. The sale price of the sweater is the original price minus the discount or 67% of the original price of the sweater, or Sale Price = 0.67 x Original Price. • A shirt is on sale for 40% off. The sale price is $12. What was the original price? What was the amount of the discount? Discount 40% of original price | Sale Price - $12 60% of original price Original Price (p) 0.60p = 12 • At a certain store, 48 television sets were sold in April. The manager at the store wants to encourage the sales team to sell more TVs and is going to give all the sales team members a bonus if the number of TVs sold increases by 30% in May. How many TVs must the sales team sell in May to receive the bonus? Justify your solution. • A salesperson set a goal to earn $2,000 in May. He receives a base salary of $500 as well as a 10% commission for all sales. How much merchandise will he have to sell to meet his goal? After eating at a restaurant, your bill before tax is $52.60 The sales tax rate is 8%. You decide to leave a 20% tip for the waiter based on the pre-tax amount. How much is the tip you leave for the waiter? How much will the total bill be, including tax and tip? Express your solution as a multiple of the bill. The amount paid = 0.20 x $52.50 + 0.08 x $52.50 = 0.28 x $52.50				

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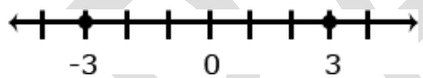
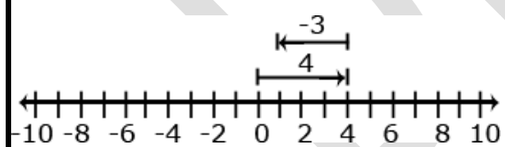
The Number System (NS)

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

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.NS.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.	7.MP.2. Reason abstractly and quantitatively 7.MP.4. Model with mathematics. 7.MP.7. Look for and make **use of structure**	Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with the operations. Examples: • Use a number line to illustrate: ○ $p - q$ ○ $p + (-q)$ ○ Is this equation true $p - q = p + (-q)$ • -3 and 3 are shown to be opposites on the number line because they are equal distance from zero and therefore have the same absolute value and the sum of the number and it's opposite is zero.  • You have $4 and you need to pay a friend $3. What will you have after paying your friend? 4 + (-3) = 1 or (-3) + 4 = 1 	Unit 1	**Gr. 7 Big Ideas Math** : Review Order of Operations (pg1) **Gr. 7 Big Ideas Math** • Lesson 1.1 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_1/section_1/g7_01_01.html • Lesson 1.2- 1.3 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_1/section_2/g7_01_02.html • Lesson 1.3 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_1/section_3/g7_01_03.html **Gr. 7 Big Ideas Math** • Sec. 1.1 • Activities 1, 2 & 3 **Gr. 7 Big Ideas Math** • Sec. 1.2 • Activities 2 & 4	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	**Ti-73 Calculator Lesson** Rational Numbers **Ti-73 Calculator Lesson** Site: Education.ti.com Touchdown. **Ti-73 Calculator Lesson** Site: Education.ti.com Adding Integers: Exploration **Ti-73 Calculator Lesson** Site: Education.ti.com Integers! It all Adds Up!

The Number System (NS)

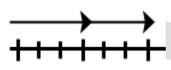
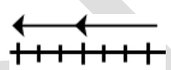
- Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
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. ***CMT/CAPT Assessment Correlation 1A 1B, and 1C, and !C*** ***CMT/CAPT Assessment Correlation 1D*** • ***CMT 7.8 A Comp. w/Fractions & Integers*** • ***CMT 8.8 A Comp. w/Fractions & Integers***				**Gr. 7 Big Ideas Math** • Sec. 1.3 • Activities 2 & 4 **Gr. 7 Big Ideas Math** • Sec. 2.2 • Activities 1 & 2 • Lesson 2.**2** http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_2/g7_02_02.html **NCTM Illuminations** Zip, Zilch, Zero http://illuminations.nctm.org/LessonDetail.aspx?id=L819 **Boardworks Middle School Math CC PowerPoints**		Ti - 73 Calculator Cards 13-15; 17-19; 28-34 **Ti-73 Calculator Lesson** Site: Education.ti.com Number Line **Ti-73 Calculator Lesson** Site: Education.ti.com Number Line Activity

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

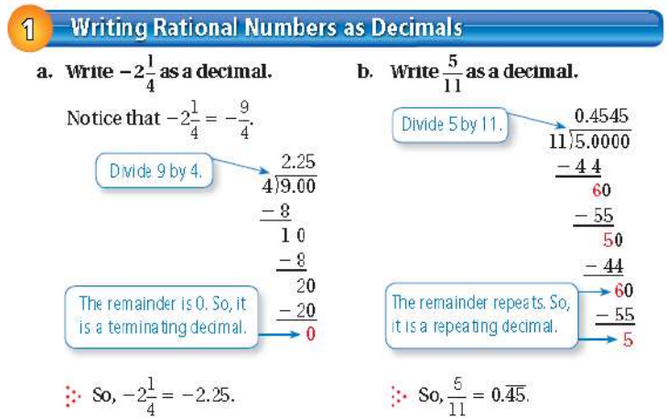
The Number System (NS)

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

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.NS.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.	7.MP.2. Reason abstractly and quantitatively 7.MP.4. Model with mathematics. 7.MP.7. Look for and make use of structure	Multiplication and division of integers is an extension of multiplication and division of whole numbers. Examples: • Examine the family of equations. What patterns do you see? Create a model and context for each of the products. Write and model the family of equations related to 3 x 4 = 12. Equation / Number Line Model / Context 2 x 3 = 6 —  — Selling two packages of apples at $3.00 per pack 2 x -3 = -6 —  — Spending 3 dollars each on 2 packages of apples -2 x 3 = -6 —  — Owing 2 dollars to each of your three friends -2 x -3 = 6 —  — Forgiving 3 debts of $2.00 each	Unit 2	**Gr. 7 Big Ideas Math** • Lesson 1.4 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_1/section_4/g7_01_04.html • Lesson 1.5 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_1/section_5/g7_01_05.html **Gr. 7 Big Ideas Math** • Sec. 1.4 • Activities 3 & 4 **Gr. 7 Big Ideas Math** • Sec. 1.4 • Activities 2 **NCTM Illuminations** Multiplying Integers Using Video Tape http://illuminations.nctm.org/LessonDetail.aspx?id=L819	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**Grade 7 Big Ideas** http://www.mathsisfun.com/rational-numbers.html **Ti-73 Calculator Lesson** Site: Education.ti.com Integers **Ti-73 Calculator Lesson** Site: Education.ti.com Gaining or Losing Yards in Football. **Ti-73 Calculator Lesson** Site: Education.ti.com Integers **Ti-73 Calculator Lesson** Site: Education.ti.com Fractions with Visual Models Ti - 73 Calculator Cards 13-19; 28- 34

The Number System (NS)

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

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
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 ***CMT/CAPT Assessment Correlation 2A*** • ***CMT 8.8 C Comp. w/Fractions & Integers*** ***CMT/CAPT Assessment Correlation 2B and 2C None*** • ***CMT 7.8 B Comp. w/Fractions & Integers*** • ***CMT 8.8 B & C Comp. w/Fractions & Integers*** ***CMT/CAPT Assessment Correlation 2D*** • ***CMT 6.3 B Equivalent Fractions, Decimals & Percents*** • ***CMT 7.3 A Equivalent Fractions, Decimals & Percents*** ***CMT 8.3 A Equivalent Fractions, Decimals & Percents***	7.MP.2. Reason abstractly and quantitatively. 7.MP.4. Model with mathematics. 7.MP.7. Look for and make use of structure.	Sample from Gr. 7 Big Ideas- Chapter 2.1  		**Gr. 7 Big Ideas Math** • Lesson 2.1 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_1/g7_02_01.html • Lesson 2.3 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_3/g7_02_03.html **Gr. 7 Big Ideas Math** • Sec. 2.1 • Activities 1 & 2 **Gr. 7 Big Ideas Math** • Sec. 2.3 • Activities 1 & 2 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**Ti-73 Calculator Lesson** Site: Education.ti.com Dividing Fractions Ti-84 Calculator Lesson Site: Education.ti.com Fractions to Decimals Ti - 73 Calculator Cards **13-19; 28- 34**

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

The Number System (NS)

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

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.) ***CMT 6.9 B Solve Word Problems*** ***CMT 7.9 A Solve Word Problems*** ***CMT 7.9 B Solve Word Problems*** ***CMT 8.9 A, B & C Solve Word Problems***	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Examples: • Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year? -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 (-32) • It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent? $\frac{-100 \text{ feet}}{20 \text{ seconds}} = \frac{-5 \text{ feet}}{1 \text{ second}} = -5 \text{ ft/sec}$	Unit 1	**Gr. 7 Big Ideas Math** • Lesson 2.3 • http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_3/g7_02_03.html • Example 4- Real Life Application Pg. 65 • Pg. 67, exercises 45 – 48 **Gr. 7 Big Ideas Math** • Pg. 68 Study Help • on process diagrams • Pg. 69, exercises 13 - 16 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**Ti-73 Calculator Lesson** Site: Education.ti.com Fraction Conversions **Ti-73 Calculator Lesson** Site: Education.ti.com Multiplication of Integers – Repeated addition and Subtraction. Ti - 73 Calculator Cards 31; 52; 53; 56

Expressions and Equations (EE)

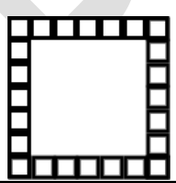
- Use properties of operations to generate equivalent expressions.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7.MP.2. Reason abstractly and quantitatively. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Examples: • Write an equivalent expression for $3(x+5)-2$. • Suzanne thinks the two expressions $2(3a-2)+4a$ and $10a-2$ are equivalent? Is she correct? Explain why or why not? • Write equivalent expressions for: $3a+12$. Possible solutions might include factoring as in $3(a+4)$, or other expressions such as $a+2a+7+5$. • A rectangle is twice as long as wide. One way to write an expression to find the perimeter would be $w+w+2w+2w$. Write the expression in two other ways. Solution: $6w$ OR $2(w)+2(2w)$.  • An equilateral triangle has a perimeter of $6x+15$. What is the length of each of the sides of the triangle? Solution: $3(2x+5)$, therefore each side is $2x+5$ units long.	Unit 5	**Gr. 7 Big Ideas Math** • Sec. 2.3 • Activities 1 & 2 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**Ti-73 Calculator Lesson** Site: Education.ti.com **Adding Up The Operations**

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

Expressions and Equations (EE)

- Use properties of operations to generate equivalent expressions.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.EE.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."* **CMT 7.23 D Algebraic Concepts** **CMT 7.23 E Algebraic Concepts** **CMT 8.23 D Algebraic Concepts** **CMT 8.23 E Algebraic Concepts**	7.MP.2. Reason abstractly and quantitatively. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Examples: • Jamie and Ted both get paid an equal hourly wage of $9 per hour. This week, Ted made an additional $27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way? Students may create several different expressions depending upon how they group the quantities in the problem. One student might say: To find the total wage, I would first multiply the number of hours Jamie worked by 9. Then I would multiply the number of hours Ted worked by 9. I would add these two values with the $27 overtime to find the total wages for the week. The student would write the expression $9J + 9T + 27$. Another student might say: To find the total wages, I would add the number of hours that Ted and Jamie worked. I would multiply the total number of hours worked by 9. I would then add the overtime to that value to get the total wages for the week. The student would write the expression $9(J + T) + 27$ • Given a square pool as shown in the picture, write four different expressions to find the total number of tiles in the border. Explain the diagram and demonstrate that the expressions are equivalent. Which expression do you think is most useful? Explain your thinking. 	Unit 5	**Gr. 7 Big Ideas Math** • Lesson 2.5 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_5/g7_02_05.html **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	**Ti-73 Calculator Lesson** Site: Education.ti.com **Four Ways To Get There**

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

Expressions and Equations (EE)

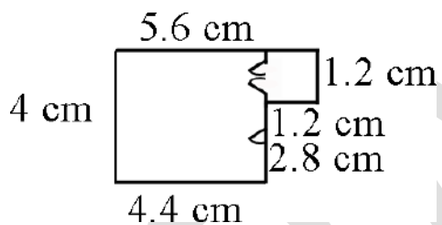
- Use properties of operations to generate equivalent expressions.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.EE.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 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. Write an equation: 25 + (25 x 1/10) = 27.50* **CMT 7.9 A, B, C & D Solve Word Problems** **CMT 8.9 A, B & C Solve Word Problems**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure	Estimation strategies for calculations with fractions and decimals extend from students' work with whole number operations. Estimation strategies include, but are not limited to: • front-end estimation with adjusting. • When the values are close together an average value is selected and multiplied by the number of values to determine an estimate), • rounding and adjusting (students round down or round up and adjust their estimate depending on how much the rounding affected the original values) • compatible numbers such as factors (i.e., rounding to factors and grouping numbers together that have round sums like 100 or 1000) • Using benchmark numbers that are easy to compute (students' select close whole numbers for fractions or decimals to determine an estimate). Example: • The youth group is going on a trip to the state fair. The trip costs $52. Included in that price is $11 for a concert ticket and the cost of 2 passes, one for the rides and one for the game booths. Each of the passes cost the same price. Write an equation representing the cost of the trip and determine the price of one pass. x | x | 11 52 For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. Write an equation: 25 + (25 x 1/10) = 27.50 If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 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. Write an equation and illustrate (27 ½ - 9 ¾) / 2 or (27.5/2) – (9.75/2)	Unit 2	**Gr. 7 Big Ideas Math** Lesson 2.5b Example 2 – Real Life • Application Pg. 73 Example 3- Real Life Application Pg. 73 • Example 3 – Real Life • Application Pg. 79 Example 4 – Real Life • Application Pg. 81b Example 4 – Real Life • Application Pg. 85 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • **Vocabulary Development**	Appendix 6 Additional Graphic Organizer: **http://www.bigideasmath.com/protected/content/ipe_/gccrade%207/extra_help/02/go_02_sh.html**

Expressions and Equations (EE)

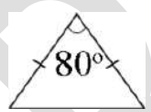
- Use properties of operations to generate equivalent expressions.

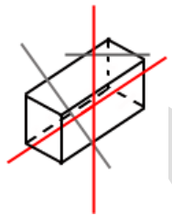
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.EE.4. Use variables to represent 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. b. 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. **CMT/CAPT Assessment Correlation 4A** • **CMT 7.23 A Algebraic Concepts** • **CMT 8.23 A, B, C, D & E Algebraic Concepts**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Examples: • Solve: $\frac{5}{4}n+5=20$ • Florencia has at most $60 to spend on clothes. She wants to buy a pair of jeans for $22 dollars and spend the rest on t-shirts. Each t-shirt costs $8. Write an inequality for the number of t-shirts she can purchase. • Steven has $25 dollars. He spent $10.81, including tax, to buy a new DVD. He needs to set aside $10.00 to pay for his lunch next week. If peanuts cost $0.38 per package including tax, what is the maximum number of packages that Steven can buy? Write an equation or inequality to model the situation. Explain how you determined whether to write an equation or inequality and the properties of the real number system that you used to find a solution. • Solve $\frac{1}{2}x+3>2$ and graph your solution on a number line. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* *ANSWER: 2(6 + x) = 54 or 2(6) + 2(x) = 54 or 2(x) + 12 =54* *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.* 50 + 3x ≥ 100	Unit 5	**Gr. 7 Big Ideas Math** • Lesson 2.6b *http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_2/section_6b/g7_02_06b.html* **Gr. 7 Big Ideas Math** http://bigideasmath.com/protected/content/ipe_cc/grade%207/02/g7_02_6b.pdf **Grade 7 Big Ideas** Math Quiz Example 5 Real Life Application • Pg. 87D Pg.. T-87D • (Graphing Activity) Pg. 87D • Exercise 22 Pg. 92 • Exercise 24, 25 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 31; 52; 53; 56 Online Numeracy Calculator http://www.crickweb.co.uk/ks2numeracy-calculation.html Additional Graphic Organizer: **http://www.bigideasmath.com/protected/content/ipe_/gccrade%207/extra_help/02/go_02_sh.html**

Geometry (G) • Draw, construct, and describe geometrical figures and describe the relationships between them.						
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.1. Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **CMT/CAPT Assessment Correlation G1 – NONE**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision.	Example: • Julie showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Julie's room? Reproduce the drawing at 3 times its current size.  	Unit 4	**Gr. 7 Big Ideas Math** • Sec. 5.3 • Activities 1 & 2- Lesson 5.3 **Gr. 7 Big Ideas Math** • Sec. 5.4 • Activities 1 & 2- Lesson 5.4 **Gr. 7 Big Ideas Math** • Sec. 5.4b • Lesson 5.4b **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	**Ti-73 Calculator Lesson** Site: Education.ti.com Only Half There? **Ti-73 Calculator Lesson** Site: Education.ti.com Proportional Flag

Geometry (G)

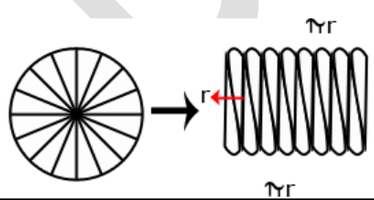
- Draw, construct, and describe geometrical figures and describe the relationships between them.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **CMT 5.17 B Geometric Shapes & Properties** **CMT 6.17 B Geometric Shapes & Properties** **CMT 7.17 B Geometric Shapes & Properties** **CMT 8.17 B Geometric Shapes & Properties**	7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Conditions may involve points, line segments, angles, parallelism, congruence, angles, and perpendicularity. Examples: Is it possible to draw a triangle with a 90° angle and one leg that is 4 inches long and one leg that is 3 inches long? If so, draw one. Is there more than one such triangle? • Draw a triangle with angles that are 60 degrees. Is this a unique triangle? Why or why not? • Draw an isosceles triangle with only one 80 degree angle. Is this the only possibility or can you draw another triangle that will also meet these conditions?  • Can you draw a triangle with sides that are 13 cm, 5 cm and 6cm? • Draw a quadrilateral with one set of parallel sides and no right angles.	Unit 3	GeoGebra 4 – Geometry Sketch Software Free Download http://www.geogebra.org/cms/en/download Geometry Lessons Using GeoGebra https://sites.google.com/site.geogebraiowa/home **NCTM Illuminations** Building with Triangles http://illuminations.nctm.org/LessonDetail.aspx?ID=U191 Triangle Construction Activities • Given 3 sides • Given 2 sides and 1 included angle • Given 2 angles and 1 included side • Given 3 angles	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti-84 Calculator Lesson Site: Education.ti.com Extension: Parallel Lines and the Sum of the Angles

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. **CMT/CAPT Assessment Correlation G3 – NONE**	7.MP.2. Reason abstractly and quantitatively. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically.	Example: • Using a clay model of a rectangular prism, describe the shapes that are created when planar cuts are made diagonally, perpendicularly, and parallel to the base. 	Unit 3	• Hands on activities using clay models. **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	

Geometry (G)

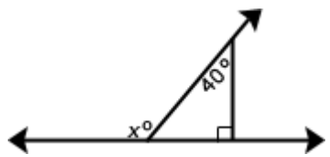
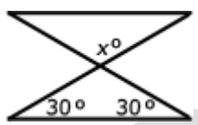
- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.4. Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **CMT 8.16 A & B Customary & Metric Measures**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Examples: • The seventh grade class is building a mini golf game for the school carnival. The end of the putting green will be a circle. If the circle is 10 feet in diameter, how many square feet of grass carpet will they need to buy to cover the circle? How might you communicate this information to the salesperson to make sure you receive a piece of carpet that is the correct size? • Students measure the circumference and diameter of several circular objects in the room (clock, trash can, door knob, wheel, etc.). Students organize their information and discover the relationship between circumference and diameter by noticing the pattern in the ratio of the measures. Students write an expression that could be used to find the circumference of a circle with any diameter and check their expression on other circles. • Students will use a circle as a model to make several equal parts as you would in a pie model. The greater number the cuts, the better. The pie pieces are laid out to form a shape similar to a parallelogram. Students will then write an expression for the area of the parallelogram related to the radius (note: the length of the base of the parallelogram is half the circumference, or πr, and the height is r, resulting in an area of πr^2. Extension: If students are given the circumference of a circle, could they write a formula to determine the circle's area or given the area of a circle, could they write the formula for the circumference? 	Unit 3	**Gr. 7 Big Ideas Math** • Sec. 6.2b **NCTM Illuminations** Pi Line http://illuminations.nctm.org/LessonDetail.aspx?id=L575 GeoGebra Demonstration Area of Circles http://www.geogebratube.org/student/m279 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	**Ti-73 Calculator Lesson** Site: Education.ti.com Circles All Around **Ti-73 Calculator Lesson** Site: Education.ti.com Circumference and Area of a Circle **Ti-73 Calculator Lesson** Site: Education.ti.com Running Circles Around Diameter

Geometry (G)

- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

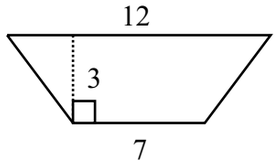
Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **CMT/CAPT Assessment Correlation G5 – NONE**	7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Angle relationships that can be explored include but are not limited to: • Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary. Examples: • Write and solve an equation to find the measure of angle *x*.  • Write and solve an equation to find the measure of angle *x*.  	Unit 3	**Gr. 8 Big Ideas Math** • Sec. 5.1 • Activity 1 Lesson 5.1 **Gr. 8 Big Ideas Math** • Sec. 5.2 • Activities 1, 2 & 3 Lesson 5.2 **Gr. 8 Big Ideas Math** • Sec. 5.3 • Activities 1, 2 & 3 Lesson 5.3 **Gr. 8 Big Ideas Math** • Sec. 5.5 • Activities 1, 2 & 3 Lesson 5.5 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti-84 Calculator Lesson Site: Education.ti.com Dynamic Geometry: Basic Construction Ti-84 Calculator Lesson Site: Education.ti.com Dynamic Geometry: Program Basics

Geometry (G)

- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.G.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. ***CMT 6.16 A Customary & Metric Measures*** ***CMT 7.16 A & B Customary & Metric Measures*** ***CMT 8.16 A. Customary & Metric Measures*** ***CMT 8.16 B Customary & Metric Measures***	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics.	Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations. Examples: • Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result?  **Continued next page…..**	Unit 3	**Gr. 7 Big Ideas Math** • Sec. 6.1 • Activities 1 & 2 • Lesson 6.1 **Gr. 7 Big Ideas Math** • Sec. 6.2 • Activities 1 & 2 • Lesson 6.2 **Gr. 7 Big Ideas Math** • Sec. 6.2b **Gr. 7 Big Ideas Math** • Sec. 6.3 • Activities 1 & 2 • Lesson 6.3 **Gr. 7 Big Ideas Math** • Sec. 6.4 • Activities 1, 2 & 3 • Lesson 6.4	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	**Ti-73 Calculator Lesson** Site: Education.ti.com Cross Fencing Pastures **Ti-73 Calculator Lesson** Site: Education.ti.com Dividing Up Area **Ti-73 Calculator Lesson** Site: Education.ti.com Geoboard and Area

	7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning	• A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class. • Find the area of a triangle with a base length of three units and a height of four units. • Find the area of the trapezoid shown below using the formulas for rectangles and triangles.  		**Gr. 7 Big Ideas Math** • Sec. 6.5 • Activities 1, 2 & 3 • Lesson 6.5 **Gr. 7 Big Ideas Math** • Sec. 6.6 • Activities 1, 2 & 3 Lesson 6.6 • GeoGebra • Itools via Math Expressions **Boardworks Middle School Math CC PowerPoints**		

Statistics and Probability (SP) • Use random sampling to draw inferences about a population.						
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. **CMT/CAPT Assessment Correlation SP1 – NONE**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Example: • The school food service wants to increase the number of students who eat hot lunch in the cafeteria. The student council has been asked to conduct a survey of the student body to determine the students' preferences for hot lunch. They have determined two ways to do the survey. The two methods are listed below. Identify the type of sampling used in each survey option. Which survey option should the student council use and why? 1. Write all of the students' names on cards and pull them out in a draw to determine who will complete the survey. 2. Survey the first 20 students that enter the lunch room.	Unit 6	**Grade 7 Big Ideas** Math • 8.1 Activities 2 & 3 pg. 349 • 8.1 Activity 3 pg 349 • 8.2 Activities 1, 2 & 3 pgs 354-55 • 8.3 Activities 1 & 2 pgs. 362-63 • Lesson 8.1 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_1/g7_08_01.html • Lesson 8.2 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_2/g7_08_02.html • Lesson 8.3 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 52-54; & 56

Statistics and Probability (SP)

- Draw informal comparative inferences about two populations.

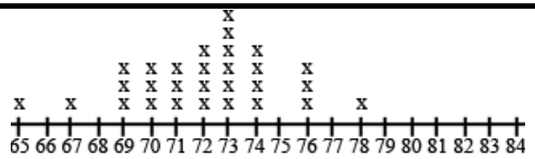
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* **CAPT 4.2.a (2)**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Example: • Below is the data collected from two random samples of 100 students regarding student's school lunch preference. Make at least two inferences based on the results. Lunch Preferences student sample / hamburgers / tacos / pizza / total #1: 12 / 14 / 74 / 100 #2: 12 / 11 / 77 / 100	Unit 6	**Grade 7 Big Ideas** Math Lesson 8.4 • Example 1-3 pg 370-371 • Exercise 11 pg 373 Lesson 8.4b • Example 1 pg 373A Extra Example 1: *http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_4/extra_example_1.html* Extra Example 2: *http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_4/on_your_own_1.html* **Gr. 7 Big Ideas Math** • Activity 3 pg 369 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 52-54; 56

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

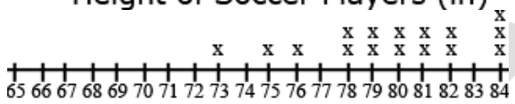
Statistics and Probability (SP)

- Draw informal comparative inferences about two populations.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* Mean absolute deviation - A measure of variation in a set of numerical data, computed by **adding the distances between each data value and the mean**, then dividing by the number of data values. Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean absolute deviation is 20. (See websites on resource column to your right **CMT/CAPT Assessment Correlation G1 – NONE**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Students can readily find data as described in the example on sports team or college websites. Other sources for data include American Fact Finder (Census Bureau), Fed Stats, Ecology Explorers, USGS, or CIA World Factbook. Researching data sets provides opportunities to connect mathematics to their interests and other academic subjects. Students can utilize statistic functions in graphing calculators or spreadsheets for calculations with larger data sets or to check their computations. Students calculate mean absolute deviations in preparation for later work with standard deviations. Example: Jason wanted to compare the mean height of the players on his favorite basketball and soccer teams. He thinks the mean height of the players on the basketball team will be greater but doesn't know how much greater. He also wonders if the variability of heights of the athletes is related to the sport they play. He thinks that there will be a greater variability in the heights of soccer players as compared to basketball players. He used the rosters and player statistics from the team websites to generate the following lists. Basketball Team – Height of Players in inches for 2010-2011 Season 75, 73, 76, 78, 79, 78, 79, 81, 80, 82, 81, 84, 82, 84, 80, 84 Soccer Team – Height of Players in inches for 2010 73, 73, 73, 72, 69, 76, 72, 73, 74, 70, 65, 71, 74, 76, 70, 72, 71, 74, 71, 74, 73, 67, 70, 72, 69, 78, 73, 76, 69 To compare the data sets, Jason creates a two dot plots on the same scale. The shortest player is 65 inches and the tallest players are 84 inches. **Continued on next page…..**	Unit 6	**Grade 7 Big Ideas Math** Lesson 8.4b • Practice: # 4 • pg 373b http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_4b/g7_08_04b.html Wiki Link http://wiki.answers.com/Q/How_do_you_calculate_mean_absolute_deviation *http://7math.wikispaces.com/Visual+Overlap* **Review Grade 6 Big Ideas Lessons on Mean, Median, Mode, and Range** **5.4- 5.6 . See activities under "Resource/Lessons"** **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 52-54 & 56



Height of Soccer Players (in)



Height of Basketball Players (in)

In looking at the distribution of the data, Jason observes that there is some overlap between the two data sets. Some players on both teams have players between 73 and 78 inches tall. Jason decides to use the mean and mean absolute deviation to compare the data sets. Jason sets up a table for each data set to help him with the calculations.

The mean height of the basketball players is 79.75 inches as compared to the mean height of the soccer players at 72.07 inches, a difference of 7.68 inches.

The mean absolute deviation (MAD) is calculated by taking the mean of the absolute deviations for each data point. The difference between each data point and the mean is recorded in the second column of the table. Jason used rounded values (80 inches for the mean height of basketball players and 72 inches for the mean height of soccer players) to find the differences. The absolute deviation, absolute value of the deviation, is recorded in the third column. The absolute deviations are summed and divided by the number of data points in the set.

The mean absolute deviation is 2.14 inches for the basketball players and 2.53 for the soccer players. These values indicate moderate variation in both data sets. There is slightly more variability in the height of the soccer players. The difference between the heights of the teams is approximately 3 times the variability of the data sets ($7.68 \div 2.53 = 3.04$).

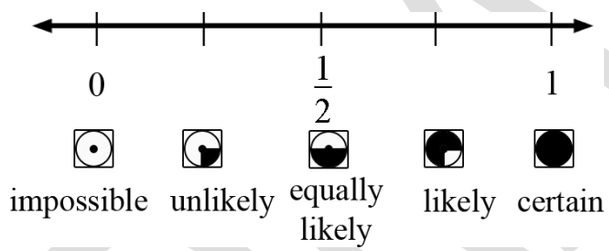
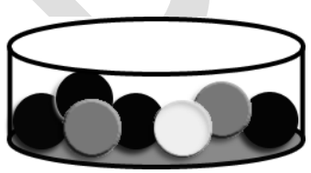
Continued on next page…..

Soccer Players (n = 29)		
Height (in)	Deviation from Mean (in)	Absolute Deviation (in)
65	-7	7
67	-5	5
69	-3	3
69	-3	3
69	-3	3
70	-2	2
70	-2	2
70	-2	2
71	-1	1
71	-1	1
71	-1	1
72	0	0
72	0	0
72	0	0
72	0	0
73	+1	1
73	+1	1
73	+1	1
73	+1	1
73	+1	1
73	+1	1
74	+2	2
74	+2	2
74	+2	2
74	+2	2
76	+4	4
76	+4	4
76	+4	4
78	+6	6
Σ = 2090		Σ = 2

Basketball Players (n = 16)		
Height (in)	Deviation from Mean (in)	Absolute Deviation (in)
73	-7	7
75	-5	5
76	-4	4
78	-2	2
78	-2	2
79	-1	1
79	-1	1
80	0	0
80	0	0
81	1	1
81	1	1
82	2	2
82	2	2
84	4	4
84	4	4
84	4	4
	Σ = 1276	

		Mean = 2090 ÷ 29 =72 inches MAD = 62 ÷ 29 = 2.13 inches	Mean = 1276 ÷ 16 =80 inches MAD = 40 ÷ 16 = 2.5 inches				

Statistics and Probability (SP) • **Investigate chance processes and develop, use, and evaluate probability models.**						
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade* ***science book.*** **CAPT 4.2.a (2)**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Measures of center include mean, median, and mode. The measures of variability include range, mean absolute deviation, and interquartile range. Example: • The two data sets below depict random samples of the housing prices sold in the King River and Toby Ranch areas of Arizona. Based on the prices below which measure of center will provide the most accurate estimation of housing prices in Arizona? Explain your reasoning. ○ King River area {1.2 million, 242000, 265500, 140000, 281000, 265000, 211000} ○ Toby Ranch homes {5million, 154000, 250000, 250000, 200000, 160000, 190000}	Unit 6	**Review Grade 6 Big Ideas Lessons on Mean, Median, Mode, and Range** **5.4- 5.6 . See activities under "Resource/Lessons"** **Grade 7 Big Ideas** Math • Example 2 pg 373b http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_8/section_4b/g7_08_04b.html **Gr. 8 Big Ideas Math** • Extra Example 3 http://static.bigideasmath.com/protected/content/dc_cc/grade_8/chapter_7/section_2/extra_example_3.html **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 52-54 & 56

Statistics and Probability (SP) • Investigate chance processes and develop, use, and evaluate probability models.						
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **CMT 3.21 A Probability** **CMT 4.21 A Probability** **CMT 5-6.21 A & B Probability** **CMT 7-8.21 A & B Probability**	7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Probability can be expressed in terms such as impossible, unlikely, likely, or certain or as a number between 0 and 1 as illustrated on the number line. Students can use simulations such as Marble Mania on AAAS or the Random Drawing Tool on NCTM's Illuminations to generate data and examine patterns. Marble Mania http://www.sciencenetlinks.com/interactives/marble/marblemania.html Random Drawing Tool - http://illuminations.nctm.org/activitydetail.aspx?id=67  Example: • The container below contains 2 gray, 1 white, and 4 black marbles. Without looking, if you choose a marble from the container, will the probability be closer to 0 or to 1 that you will select a white marble? A gray marble? A black marble? Justify each of your predictions. 	Unit 7	**Review Grade 6 Big Ideas Lessons on Mean, Median, Mode, and Range** **5.4- 5.6 . See activities under "Resource/Lessons"** **Grade 7 Big Ideas** • Lesson 9.1 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_1/g7_09_01.html • Practice and Problem Solving 2-27 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/study_help/g7_09_sh.html Gr. 7 Big Ideas • Teacher's Edition, Exercise 27 pg 389 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_1/te_exercise_27.html **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	

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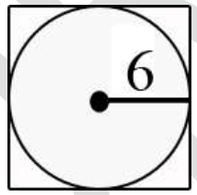
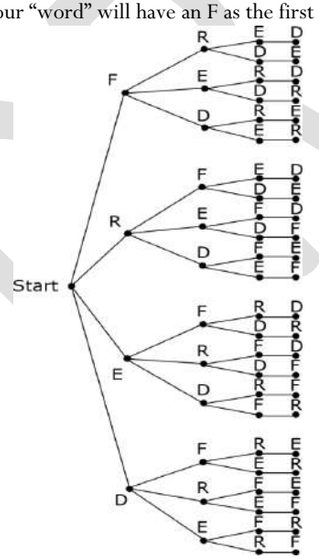
7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.* **CMT 7.21 C Probability** **CMT 8.21 C Probability**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically.	Students can collect data using physical objects or graphing calculator or web-based simulations. Students can perform experiments multiple times, pool data with other groups, or increase the number of trials in a simulation to look at the long-run relative frequencies. Example: Each group receives a bag that contains 4 green marbles, 6 red marbles, and 10 blue marbles. Each group performs 50 pulls, recording the color of marble drawn and replacing the marble into the bag before the next draw. Students compile their data as a group and then as a class. They summarize their data as experimental probabilities and make conjectures about theoretical probabilities (How many green draws would you expect if you were to conduct 1000 pulls? 10,000 pulls?). Students create another scenario with a different ratio of marbles in the bag and make a conjecture about the outcome of 50 marble pulls with replacement. (An example would be 3 green marbles, 6 blue marbles, and 3 blue marbles.) Students try the experiment and compare their predictions to the experimental outcomes to continue to explore and refine conjectures about theoretical probability.	Unit 7	**Gr. 7 Big Ideas Math** • Activity 1 pg 390 • Activity 2 pg 391 • Activity 3 pg 391 Lesson 9.2 • Examples 1-3 • pages 392- 393 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_2/g7_09_02.html • Practice and Problem Solving pg 394-395 • Exercises 4-20 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 23 ; 29-31

Waterbury Public Schools Mathematics Standards Articulated by Grade Level
Grade 7

Statistics and Probability (SP) • Investigate chance processes and develop, use, and evaluate probability models.						
Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.*?* **CMT/CAPT Assessment Correlation 7A** • **CMT 8.21 C Probability** **CMT/CAPT Assessment Correlation** **7B – NONE**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.3. Construct viable arguments and critique the reasoning of others. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.6. Attend to precision. 7.MP.7. Look for and make use of structure.	Students need multiple opportunities to perform probability experiments and compare these results to theoretical probabilities. Critical components of the experiment process are making predictions about the outcomes by applying the principles of theoretical probability, comparing the predictions to the outcomes of the experiments, and replicating the experiment to compare results. Experiments can be replicated by the same group or by compiling class data. Experiments can be conducted using various random generation devices including, but not limited to, bag pulls, spinners, number cubes, coin toss, and colored chips. Students can collect data using physical objects or graphing calculator or web-based simulations. Students can also develop models for geometric probability (i.e. a target). Example: • If you choose a point in the square, what is the probability that it is not in the circle?  *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies*	Unit 7	**Gr. 7 Big Ideas Math** • Activity 1 pg 398 • Activity 2 pg 399 • Activity 3 pg 399 **Gr. 7 Big Ideas Math** • Lesson 9.3 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_3/g7_09_03.html • Examples 1-3 pages 400-401 • Practice and Problem Solving pg 402-403 • Exercise 3- 23 *http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_4/on_your_own_3_4.html* **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	

Statistics and Probability (SP)

- Investigate chance processes and develop, use, and evaluate probability models.

Standards *Students will be able to:* **(CMT/CAPT Correlation)**	**Mathematical Practices**	**Explanations and Examples of Standard**	**CT Units of Study**	**Resources/ Lessons Supporting CT Standard(s)**	**Minimum Required Strategies**	**Supporting Technology Activities**
7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?* **CMT/CAPT Assessment Correlation 8A**	7.MP.1. Make sense of problems and persevere in solving them. 7.MP.2. Reason abstractly and quantitatively. 7.MP.4. Model with mathematics. 7.MP.5. Use appropriate tools strategically. 7.MP.7. Look for and make use of structure. 7.MP.8. Look for and express regularity in repeated reasoning.	Examples: • Students conduct a bag pull experiment. A bag contains 5 marbles. There is one red marble, two blue marbles and two purple marbles. Students will draw one marble without replacement and then draw another. What is the sample space for this situation? Explain how you determined the sample space and how you will use it to find the probability of drawing one blue marble followed by another blue marble. • Show all possible arrangements of the letters in the word FRED using a tree diagram. If each of the letters is on a tile and drawn at random, what is the probability that you will draw the letters F-R-E-D in that order? What is the probability that your "word" will have an F as the first letter? 	Unit 7	**Gr. 7 Big Ideas Math** • Activity 1 pg 404 • Activity 2 pg 404 • Activity 3 pg 405 **Gr. 7 Big Ideas Math** • Lesson 9.4 http://static.bigideasmath.com/protected/content/dc_cc/grade_7/chapter_9/section_4/g7_09_04.html • Examples 1-3 • pgs 406-408 • Practice and Problem Solving 5-35 pg 409 – 411 **Boardworks Middle School Math CC PowerPoints**	• Identifying Similarities and Differences • Note Taking • Summarizing • Cooperative Learning • Nonlinguistic Representations • Vocabulary Development	Ti - 73 Calculator Cards 23 ; 29-31

• **CMT 8.21 C Probability** **CMT/CAPT Assessment Correlation 8B** • **CMT 7.24 A & B Classification & Logical Reasoning** • **CMT 7.25 A Mathematical Applications** • **CMT 8.24 A & B Classification & Logical Reasoning** **CMT/CAPT Assessment Correlation 8C - NONE**						

CMT Connections

Strand Grade 7 Concepts/Skills Assessed

1. Place Value

A. Solve problems involving 0.1 MORE/LESS or 0.01 MORE/LESS than a given number.
B. Identify alternative forms of expressing whole numbers and decimals using expanded notation.
C. Identify alternative forms of expressing numbers using scientific notation.

2. Pictorial Representation of Numbers

A. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa.
B. Identify and/or shade fractional parts of regions or sets, decimals and mixed numbers in pictures.

3. Equivalent Fractions, Decimals and Percents

A. Rename fractions and mixed numbers as equivalent decimals and vice versa.
B. Rename fractions and decimals (up to 1.00) as equivalent percents and vice versa.

4. Order, Magnitude and Rounding of Numbers

A. Order whole numbers and decimals.
B. Order fractions and decimals including mixed numbers in context.
C. Describe magnitude of whole numbers and decimals in and out of context.
D. Describe magnitude or order of fractions and mixed numbers in context.
E. Round whole numbers, fractions and decimals in context.
F. Locate points on number lines and scales, including fractions, mixed numbers, decimals and integers.

5. Models for Operations

A. Identify the appropriate operation or equation to solve a story problem.
B. Write a story problem from an equation.

6. Basic Facts (Not tested)

7. Computation with Whole Numbers and Decimals

A. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts and decimals.
B. Multiply and divide 2- and 3-digit whole numbers, money amounts and decimals by 1-digit numbers and decimals (multiply only).
C. Multiply and divide whole numbers and decimals by 10, 100 and 1,000.

8. Computation with Fractions and Integers

A. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators.
B. Multiply whole numbers and fractions by fractions and mixed numbers.
C. Add positive and negative integers (range -20 to 20).

9. Solve Word Problems

A. Solve one-step story problems involving whole numbers, fractions, decimals and money amounts with or without extraneous information.
B. Solve multistep problems involving fractions and mixed numbers with or without extraneous information.
C. Solve multistep problems involving whole numbers, decimals, money amounts and mixed numbers, including means.
D. Solve multistep problems involving whole numbers, decimals or money amounts, and explain how the solution was determined.

10. Numerical Estimation Strategies

A. Identify the best expression to find an estimate.
B. Identify whether and why a particular strategy will result in an overestimate or an underestimate.

11. Estimating Solutions to Problems

A. Identify a reasonable estimate to a problem.
B. Determine a reasonable estimate, and describe the strategy used to arrive at the estimate.
C. Given an estimate as a solution, judge its reasonableness and justify the decision.

12. Ratios and Proportions

A. Solve problems involving ratios.
B. Solve 1-step problems involving proportions in context.

13. Computation with Percents

A. Find percents of whole numbers or the percent a given number is of another number.
B. Solve 1-step problems involving percents in context.

14. Time (Not tested)

15. Approximating Measures

A. Estimate lengths, areas and angle measures.

16. Customary and Metric Measures

A. Measure and determine perimeters, areas and volumes. Explain or show how the solution was determined.
B. Determine perimeters, areas and volumes.
C. Identify appropriate customary or metric units of measure for a given situation.
D. Solve problems involving conversions of customary or metric units of measure.
E. Solve problems involving conversions of time units.

17. Geometric Shapes and Properties

A. Identify, describe or classify 2- and 3-dimensional geometric shapes and figures.
B. Draw, describe and classify 2- dimensional geometric shapes and figures.

18. Spatial Relationships

A. Identify lines of symmetry.
B. Draw lines of symmetry.
C. Identify congruent and similar figures.
D. Identify and explain congruent or similar figures.
E. Locate and draw points on grids.
F. Identify geometric transformations (reflections, rotations and translations).
G. Draw geometric transformations (reflections and rotations).
H. Relate 2- and 3-dimensional representations and visa versa.

19. Tables, Graphs and Charts

A. Identify correct information from tables, graphs and charts.
B. Create bar graphs, line graphs and stem-and-leaf plots from data in tables and charts.

20. Statistics and Data Analysis

A. Draw reasonable conclusions from data in tables, graphs and charts.
B. State a conclusion and explain why an answer is or is not reasonable based on the data.
C. Solve problems involving means, medians, modes and ranges of sets of data.

21. Probability

A. Identify correct solutions to problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents.
B. Solve problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents and justify solutions.
C. Solve problems involving expected outcomes or predictions and justify solutions.

22. Patterns

A. Identify the missing terms in a pattern, or identify rules for a given pattern using numbers and attributes.
B. Extend or complete patterns and state rules for given patterns using numbers and attributes.

23. Algebraic Concepts

A. Solve simple 1- or 2-step algebraic equations.
B. Use order of operations.
C. Evaluate expressions or solve equations and use formulas.
D. Represent situations with algebraic expressions.
E. Write an expression to represent a situation.

24. Classification and Logical Reasoning

A. Solve problems involving the organization of data.
B. Sort or classify objects, and draw logical conclusions from data including Venn diagrams, combinations, permutations and transitive reasoning questions.

25. Mathematical Applications

A. Solve extended numerical, statistical and spatial problems.