South Carolina College- and Career-Ready Standards for Mathematics

8th Grade Support Document

South Carolina Department of Education
Office of Standards and Learning
September 2015 - DRAFT

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South Carolina College- and Career-Ready Standards for Mathematics
Grade 8 Overview

The Table of Contents below arranges the *South Carolina College- and Career-Ready Standards for Mathematics* for middle school into *Course Coversheets* and *Units*.

- Each middle school *Course Coversheet* organizes the middle school course standards into possible instructional units and provides links to specific middle school course *Units*.
- Each middle school course *Unit* contains:
  - Clarifying notes related to the standards within the unit
  - New academic vocabulary in the unit
  - Prior and subsequent knowledge related to the unit
  - Description of the relationship between the standards in the unit
  - Potential instructional strategies and lessons
  - Resources for the unit
  - Sample formative assessment tasks and questions

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Grade 8 Coversheet

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Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Transformational Geometry	Exponents	Algebraic Geometry	Functions	Linear Functions	Statistics with Linear Models	Systems of Equations
Standards	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**
8.GM.1	8.NS.1	8.GM.6	8.F.1	8.EEI.5	8.DSP.1	8.EEI.7
8.GM.2	8.NS.2	8.GM.7	8.F.2	8.EEI.6	8.DSP.2	8.EEI.8
8.GM.3	8.NS.3	8.GM.8		8.F.3	8.DSP.3	
8.GM.4	8.EEI.1	8.GM.9		8.F.4	8.DSP.4	
8.GM.5	8.EEI.2	8.EEI.2		8.F.5	8.F.3	
	8.EEI.3				8.F.4	
	8.EEI.4				8.F.5	
	8.EEI.7a					
	8.EEI.7b					
	8.DSP.5					

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Mathematical Process Standards: The South Carolina College- and Career-Ready (SCCCR) Mathematical Process Standards demonstrate the ways in which students develop conceptual understanding of mathematical content and apply mathematical skills. As a result, the SCCCR Mathematical Process Standards should be integrated within the SCCCR Content Standards for Mathematics for each grade level and course. Since the process standards drive the pedagogical component of teaching and serve as the means by which students should demonstrate understanding of the content standards, the process standards must be incorporated as an integral part of overall student expectations when assessing content understanding.

1. Make sense of problems and persevere in solving them. a. Relate a problem to prior knowledge. b. Recognize there may be multiple entry points to a problem and more than one path to a solution. c. Analyze what is given, what is not given, what is being asked, and what strategies are needed, and make an initial attempt to solve a problem. d. Evaluate the success of an approach to solve a problem and refine it if necessary.	**5. Use a variety of mathematical tools effectively and strategically.** a. Select and use appropriate tools when solving a mathematical problem. b. Use technological tools and other external mathematical resources to explore and deepen understanding of concepts.
2. Reason both contextually and abstractly. a. Make sense of quantities and their relationships in mathematical and real-world situations. b. Describe a given situation using multiple mathematical representations. c. Translate among multiple mathematical representations and compare the meanings each representation conveys about the situation. d. Connect the meaning of mathematical operations to the context of a given situation.	**6. Communicate mathematically and approach mathematical situations with precision.** a. Express numerical answers with the degree of precision appropriate for the context of a situation. b. Represent numbers in an appropriate form according to the context of the situation. c. Use appropriate and precise mathematical language. d. Use appropriate units, scales, and labels.
3. Use critical thinking skills to justify mathematical reasoning and critique the reasoning of others. a. Construct and justify a solution to a problem. b. Compare and discuss the validity of various reasoning strategies. c. Make conjectures and explore their validity. d. Reflect on and provide thoughtful responses to the reasoning of others.	**7. Identify and utilize structure and patterns.** a. Recognize complex mathematical objects as being composed of more than one simple object. b. Recognize mathematical repetition in order to make generalizations. c. Look for structures to interpret meaning and develop solution strategies.
4. Connect mathematical ideas and real-world situations through modeling. a. Identify relevant quantities and develop a model to describe their relationships. b. Interpret mathematical models in the context of the situation. c. Make assumptions and estimates to simplify complicated situations. d. Evaluate the reasonableness of a model and refine if necessary.	

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Unit Title
Transformational Geometry
Content Standards with Clarifying Notes *Open bullets indicate clarifying notes.*
● 8.GM.1 Investigate the properties of rigid transformations (rotations, reflections, translations) using a variety of tools (e.g., grid paper, reflective devices, graphing paper, technology). a. Verify that lines are mapped to lines, including parallel lines. b. Verify that corresponding angles are congruent. c. Verify that corresponding line segments are congruent. ○ Understand that rigid transformations maintain congruence (rotations, reflections, translations) ○ A line segment can be rotated, reflected, and translated and remain the same length. ○ Angles can be rotated, reflected, and translated and still have the same measure. ○ Parallel lines can be rotated, reflected, and translated and still remain parallel. ● 8.GM.2 Apply the properties of rigid transformations (rotations, reflections, translations). a. Rotate geometric figures 90, 180, and 270 degrees, both clockwise and counterclockwise, about the origin. b. Reflect geometric figures with respect to the *x*-axis and/or *y*-axis. c. Translate geometric figures vertically and/or horizontally. d. Recognize that two-dimensional figures are only congruent if a series of rigid transformations can be performed to map the pre-image to the image. e. Given two congruent figures, describe the series of rigid transformations that justifies this congruence. ○ Recognize that the pre-image is the original figure, and the image is the figure after transformations have been applied. ○ Two-dimensional figures are congruent if corresponding sides and angles are equal. ○ A two-dimensional figure is congruent to another if the second one can be obtained from the first by a sequence of rotations, reflections, or translations. ○ When given two congruent figures, they can describe a sequence that exhibits the congruence between them.

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- 8.GM.3 Investigate the properties of transformations (rotations, reflections, translations, dilations) using a variety of tools (e.g., grid paper, reflective devices, graphing paper, dynamic software).
  - a. Use coordinate geometry to describe the effect of transformations on two-dimensional figures.
  - b. Relate scale drawings to dilations of geometric figures.
    - Understand that a dilation is not a rigid transformation.
    - Understand that a dilation with a scale factor between 0 and 1 results in a shrink/reduction. Limit scale factors to positive rational numbers.
    - Understand that a dilation with a scale factor greater than 1 results in a stretch/enlargement.
    - Recognize that the only dilation that maintains congruence is with a scale factor of 1.
    - Describe the effect of rotations, reflections, translations, and dilations on two-dimensional figures using coordinates.
- 8.GM.4 Apply the properties of transformations (rotations, reflections, translations, dilations).
  - a. Dilate geometric figures using scale factors that are positive rational numbers.
  - b. Recognize that two-dimensional figures are only similar if a series of transformations can be performed to map the pre-image to the image.
  - c. Given two similar figures, describe the series of transformations that justifies this similarity.
  - d. Use proportional reasoning to find the missing side lengths of two similar figures.
    - Two-dimensional figures are similar if corresponding sides are proportional and corresponding angles are congruent.
    - A two-dimensional figure is similar to another if the second one can be obtained from the first by a sequence of rotations, reflections, translations, and/or dilations.
    - When given two similar figures, describe a sequence that exhibits the similarity between them.
- 8.GM.5 Extend and apply previous knowledge of angles to properties of triangles, similar figures, and parallel lines cut by a transversal.
  - a. Discover that the sum of the three angles in a triangle is 180 degrees.
  - b. Discover and use the relationship between interior and exterior angles of a triangle.
  - c. Identify congruent and supplementary pairs of angles when two parallel lines are cut by a transversal.
  - d. Recognize that two similar figures have congruent corresponding angles.
    - Given two interior angle measurements for any triangle, you can find all interior and exterior angle measurements for that triangle.
    - The sum of the measures of the three angles in any triangle is 180 degrees.
    - The measure of an exterior angle of a triangle is equal to the sum of the measures of the other two interior angles.
    - A transversal is the line that cuts two parallel lines.
    - Algebraic expressions should be used in addition to numerical values to represent angle measures.
    - Recognize that alternate interior, alternate exterior, and corresponding angles are congruent when two parallel lines are cut by a transversal. (This does not hold true for non-parallel lines.)
    - Recognize that consecutive interior angles are supplementary when two parallel lines are cut by a transversal. (This does not hold true for non-parallel lines.)
    - When two angles of one triangle are congruent to two angles of another, the triangles are similar.

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New Academic Vocabulary for This Unit
● Pre-image ● Rigid Transformations/Rigid Motions ● Isometry ● Clockwise ● Counterclockwise ● Dilations ● Center of Dilation ● Transversal ● Exterior Angles ● Corresponding Angles ● Alternate Interior Angles ● Alternate Exterior Angles ● Consecutive Interior Angles

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Prior Knowledge Required for this Unit
● Plot points in all four quadrants of the coordinate plane (6.NS.8) ● Graph proportional relationships on the coordinate plane (7.RP.2) ● Determine when two quantities are in a proportional relationship (7.RP.2) ● Construct triangles and quadrilaterals given specific measures/parameters of either angles or sides (7.GM.2) ● Write equations to solve problems involving the relationships between angles formed by two intersecting lines, including supplementary, complementary, vertical, and adjacent (7.GM.5)
Subsequent Knowledge Related to this Unit
By the end of this unit, students should be fluent in plotting points in the coordinate plane. In high school mathematics courses, students will extend their knowledge of transformations to vectors and matrices. They will also develop proofs for the angle relationships formed by lines (parallel and nonparallel) cut by a transversal. Additionally, high school courses will extend students' knowledge of dilations to include negative scale factors and create fractals. Proofs for congruence and similarity (e.g., Side-Angle-Side, Side-Side-Side, Angle-Angle) will also draw on students' knowledge of transformations.
Relationship Among Standards in this Unit
Standards in this unit are all necessary to develop an understanding of the impact transformations have on congruence and similarity among figures.

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Potential Instructional Strategies/Lessons
● Use patty paper, transparency sheets, or MIRAs to show transformations ● Provide sentence starters for students to be able to describe the effects of transformations ● Use paper folding to discover/prove that the sum of the angles in a triangle equal 180^0 ● Geogebra software (http://www.geogebra.org/) ○ Use geometry software to make and compare transformations ○ Use geometry software to show two parallel lines cut by a transversal ● Geometer's Sketchpad (http://www.dynamicgeometry.com/) ○ Use geometry software to make and compare transformations ○ Use geometry software to show two parallel lines cut by a transversal ● Compass and straightedge
Resources
8.GM.1 - This website allows students to investigate rigid transformations on a coordinate plane. http://www.sciencekids.co.nz/gamesactivities/math/transformation.html 8.GM.2 - This website contains a lesson/activity that allows students to strengthen their skills with rigid transformations. Isometry is the term used in this lesson. http://www.cpalms.org/Public/PreviewResourceLesson/Preview/64769 8.GM.4 - This website provides students with the opportunity to interactively work with dilations. http://nlvm.usu.edu/en/nav/frames_asid_295_g_3_t_3.html?open=activities&from=topic_t_3.html 8.GM.5 - This website allows students to manipulate pairs of lines cut by a transversal and further explore any pair relationships. http://www.mathwarehouse.com/geometry/angle/parallel-lines-cut-transversal.php

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Sample Formative Assessment Tasks/Questions
8.GM.1 and 8.GM.2: This task challenges a student to use transformations, reflections and rotations on a coordinate grid.  Aaron's Designs.pdf Source: Mathematics Assessment Resource Service
8.GM.3 and 8.GM.4: In this task, students sketch a logo on graph paper use coordinate points to perform transformations.  Corporate Logos Project.docx

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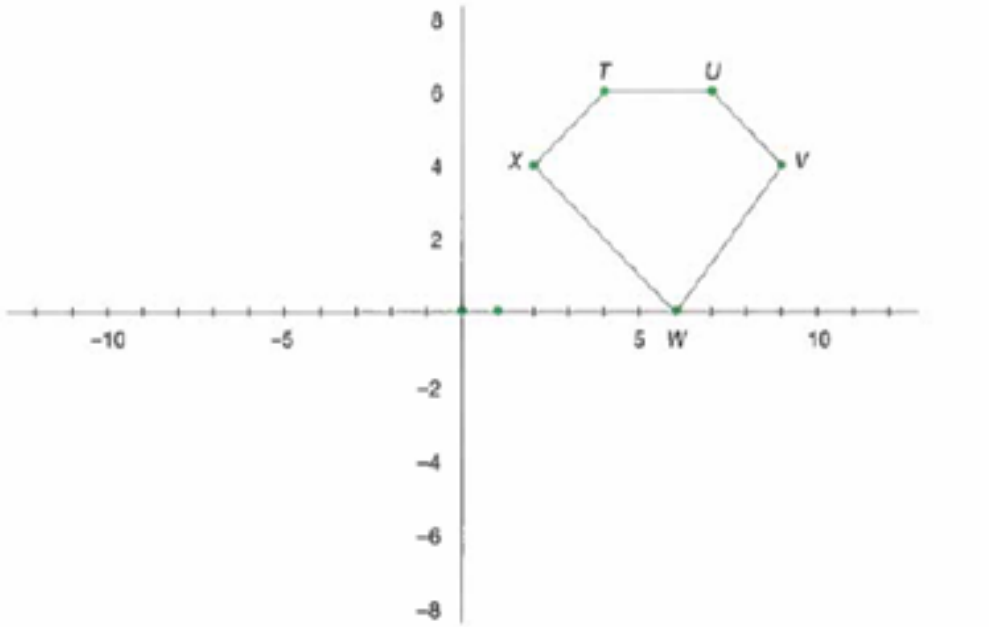
8.GM.3 and 8.GM.4: Which of the following represents the coordinates of the vertices after a rotation of 180° about the origin?



a. *T*'(-4, -6), *U*'(-7, -6), *V*'(-9, -4), *W*'(-6, 0), *X*'(-2, -4)
b. *T*'(-4, 6), *U*'(-7, 6), *V*'(-9, 4), *W*'(-6, 0), *X*'(-2, 4)
c. *T*'(4, -6), *U*'(7, -6), *V*'(9, -4), *W*'(6, 0), *X*'(2, -4)
d. *T*'(6, 4), *U*'(6, 7), *V*'(4, 9), *W*'(0, 6), *X*'(4, 2)

Answer: a. *T*'(-4, -6), *U*'(-7, -6), *V*'(-9, -4), *W*'(-6, 0), *X*'(-2, -4)
Source: Mathematics Assessment Sampler 6-8

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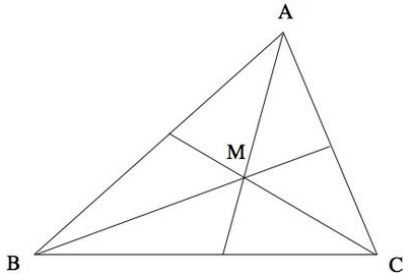
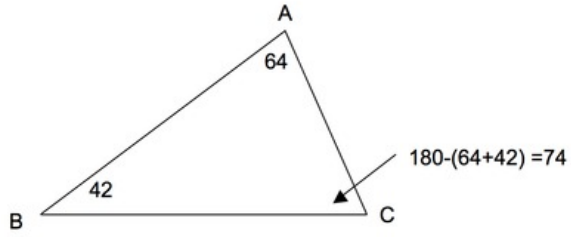
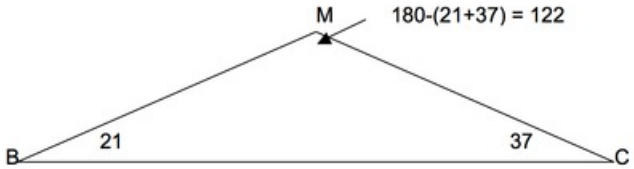
8.GM.5: In triangle Δ*ABC*, point *M* is the point of intersection of the bisectors of angles $\angle BAC$, $\angle ABC$, and $\angle ACB$. The measure of $\angle ABC$ is 42°, and the measure of $\angle BAC$ is 64°. What is the measure of $\angle BMC$?



Answer: All angle measurements are in degrees.
The solution is obtained by applying the Triangle Sum Theorem twice. First apply it to the Δ*ABC* to find the measure of $\angle ACB$. This angle has measure 180°−(64°+42°) = 180°−(106°) =74°:



Now consider the triangle BMC. Since the segment BM bisects the angle ABC of the triangle, we have the measure of $\angle MBC$ is half the measure of $\angle ABC$, which is half of 42°, or 21°. Similarly, the measure of $\angle MCB$ is half of angle $\angle ACB$, which is half of 74°,which is 37°. Now use the Triangle Sum Theorem on the Δ*BMC* to find that the measure of $\angle BMC$ is 180°−(37°+21°)=180°−58°=122°:



Source: Illustrative Mathematics

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Unit Title
Exponents
Content Standards with Clarifying Notes *Open bullets indicate clarifying notes.*

- 8.NS.1 Explore the real number system and its appropriate usage in real-world situations.
  - a. Recognize the differences between rational and irrational numbers.
  - b. Understand that all real numbers have a decimal expansion.
  - c. Model the hierarchy of the real number system, including natural, whole, integer, rational, and irrational numbers.
    - Rational numbers are all fractions, decimals (terminating and repeating), and integers
    - Irrational numbers are non-terminating and non-repeating decimals
    - Irrational numbers include the square roots of non-perfect squares
- 8.NS.2 Estimate and compare the value of irrational numbers by plotting them on a number line.
  - Use square roots of perfect squares as benchmarks on a number line
- 8.NS.3 Extend prior knowledge to translate among multiple representations of rational numbers (fractions, decimal numbers, percentages). Include the conversion of repeating decimal numbers to fractions.
  - Use algorithmic approach to teach all repeating decimals
- 8.EEI.1 Understand and apply the laws of exponents (i.e. product rule, quotient rule, power to a power, product to a power, quotient to a power, zero power property, negative exponents) to simplify numerical expressions that include integer exponents.
  - Use conceptual understanding to demonstrate mastery of the laws
  - Negative exponents indicates a fractional value not the additive inverse of the base raised to the positive exponent (ex: $3^{-2} \neq -9$)
  - Recognize difference between opposite of a value squared and a negative value squared (ex: $-3^2 \neq (-3)^2$)
- 8.EEI.2 Investigate concepts of square and cube roots.
  - a. Find the exact and approximate solutions to equations of the form $x^2 = p$ and $x^3 = p$ where p is a positive rational number.
  - b. Evaluate square roots of perfect squares.
  - c. Evaluate cube roots of perfect cubes.
  - d. Recognize that square roots of non-perfect squares are irrational.
    - A number being multiplied by itself twice as a perfect square
    - A number being multiplied by itself three times as a perfect cube
    - Inverse operations of squaring and cubing a number
    - Use square roots of perfect square to approximate square roots of non-perfect squares

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- 8.EEI.3 Explore the relationship between quantities in decimal and scientific notation.
  - a. Express very large and very small quantities in scientific notation in the form $a \times 10^b = p$ where $1 \leq a < 10$ and b is an integer.
  - b. Translate between decimal notation and scientific notation.
  - c. Estimate and compare the relative size of two quantities in scientific notation.
    - Emphasize that scientific notation must be a rational number greater than or equal to 1 but less than 10
- 8.EEI.4 Apply the concepts of decimal and scientific notation to solve real-world and mathematical problems.
  - a. Multiply and divide numbers expressed in both decimal and scientific notation.
  - b. Select appropriate units of measure when representing answers in scientific notation.
  - c. Translate how different technological devices display numbers in scientific notation.
    - Recognize that when multiplying and dividing numbers expressed in scientific notation the order of factors will not matter
    - Recognize that the answer when performing operations with scientific notation will not necessarily be in scientific notation which leads to conversion back to scientific notation
- 8.EEI.7 Extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations.
  - a. Solve linear equations and inequalities with rational number coefficients that include the use of the distributive property, combining like terms, and variables on both sides.
  - b. Recognize the three types of solutions to linear equations: one solution($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$).
    - Students solve one-variable equations with the variables being on both sides of the equals sign. Students recognize that the solution to the equation is the value(s) of the variable, which make a true equality when substituted back into the equation. Equations shall include rational numbers, distributive property and combining like terms.
    - Recognize that infinitely many solutions means that any value substituted for the variable will make the equality true
    - Recognize that no solution means that no value of the variable will make the equality true
- 8.DSP.5 Organize data in matrices with rational numbers and apply to real-world and mathematical situations.
  - a. Understand that a matrix is a way to organize data.
  - b. Recognize that a $m \times n$ matrix has m rows and n columns.
  - c. Add and subtract matrices of the same size.
  - d. Multiply a matrix by a scalar.
    - When naming a matrix, rows always precede columns
    - When performing operations with matrices, use corresponding cells/entries
    - Addition and subtraction of matrices must be performed on matrices with like rows and columns
    - Scalar multiplication for a matrix is representative of the distributive property of an expression

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New Academic Vocabulary for This Unit
● Square root ● Perfect square ● Cube root ● Perfect cube ● Radical ● Irrational number (π) ● Scientific notation ● Matrix ● Rows ● Columns ● Scalar ● Subset

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Prior Knowledge Required for this Unit
● Fluent with the subsets of the number systems (real, natural, whole, integers, and rational) (6.NS.6) ● Fluent with plotting points on a number line (horizontal and vertical) (6.NS.8) ● Convert rational numbers to decimals using long division (terminating and repeating) (6.NS.9, 7.NS.5) ● Understand exponents as repeated multiplication (5.NSBT.2) ● Compute fluently with integers (7.NS.1, 7.NS.2) ● Translate among multiple representations of rational numbers, including repeating decimals to fractions (6.NS.9, 7.NS.5) ● Understand the implication of inverse operations (6.EEI.7) ● Fluent with the powers of ten to make a number larger or smaller in the place value system (5.NSBT.2) ● Fluent in solving multi-step linear equations and inequalities with the variable on one side and rational number coefficients. Include combining like terms and applying the distributive property (7.EEI.4) ● Knowledge of multiple ways to display data (3.MDA.3, 3.MDA.4, 4.MDA.4, 6.DS.4)
Subsequent Knowledge Related to this Unit
Students will extend their knowledge of the laws of exponents to algebraic expressions and rational exponents for high school courses. The students' fluency in solving multi-step equations with variables on both sides will assist them with solving systems of equations later in Grade 8 and systems of inequalities in high school courses. Students will extend their knowledge of matrices in high school courses.
Relationship Among Standards in this Unit
Standards in this unit are all necessary to develop the computational skills needed for work within the real number system including solving multi-step linear equations and inequalities and simplifying expressions which include the use of integer exponents.

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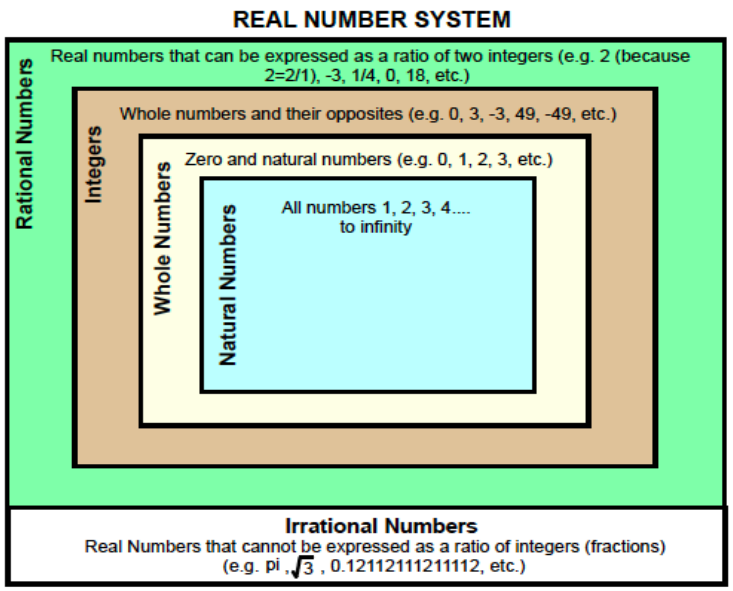
Potential Instructional Strategies/Lessons

- Algebra Tiles
- Human Number Line
- Graphic Organizers
    - 

The colored section of this chart can be thought of as stacking on top of each other like Russian stacking dolls with natural numbers (sometimes called counting numbers) being the smallest "doll". Whole numbers include all natural numbers, but also incorporate zero. Integers include all natural and whole numbers and their opposites. Finally, rational numbers contain all natural and whole numbers and their opposites along with fractions and decimals. They can be written in fractional form. Irrational numbers are also part of the Real Number System. However, they cannot be written as a fraction.

- Algebraic Proof for Negative Exponent: http://www.projectstar-edex.com/watch/?v=AUr6ZaAlyqo
- Technology with Scientific Notation: http://mathbits.com/MathBits/TISection/General/ScientificNotation.htm

Resources
6–8 Progression Document for Expressions and Equations: https://commoncoretools.files.wordpress.com/2011/04/ccss_progression_ee_2011_04_25.pdf This document supports instruction of standards associated with Expressions, Equations, and Inequalities https://www.engageny.org/sites/default/files/resource/attachments/math-g8-m4-teacher-materials.pdf. 8.NS.1 - Distinguish between rational and irrational numbers. https://learnzillion.com/resources/8892 8.EEI.1 - This website demonstrates how to derive the laws of exponents. Use this website as a guide for lesson planning. http://www.mathsisfun.com/algebra/exponent-laws.html 8.EEI.1 - Why does $x^0 = 1$? http://www.homeschoolmath.net/teaching/negative_zero_exponents.php 8.EEI.2 - This document is an activity for learning squares and square roots. http://betterlesson.com/lesson/resource/1987846/perfect-squares-tile-activity-pdf 8.EEI.2 - This document is an activity for learning cubes and cube roots. http://betterlesson.com/lesson/resource/2599382/perfect-cubes-activity-pdf?from=section_resources_title 8.EEI.3 - Relationship between decimal notation and scientific notation. http://www.regentsprep.org/regents/math/algebra/AO2/TScicard2.htm 8.EEI.4 - Applying concepts of decimal and scientific notation. https://ims.ode.state.oh.us/ODE/IMS/Lessons/Content/CMA_LP_S01_BI_L08_I08_01.pdf 8.EEI.7 - Solving linear equation and inequalities with variables on both sides. http://www.doe.virginia.gov/testing/solsearch/sol/math/8/mess_8-15a.pdf 8.DSP.5 - This blog provides examples and instructional techniques for operations with matrices. http://www.shelovesmath.com/algebra/advanced-algebra/matrices-and-solving-systems-with-matrices/

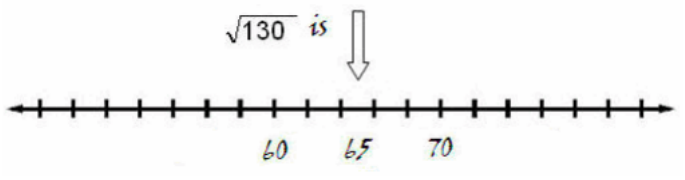
Sample Formative Assessment Tasks/Questions

8.NS.1: Analyze Robin's reasoning in her answer to the test question about rational or irrational numbers. Does she have a deep understanding of rational and irrational numbers? Does her reasoning make sense? If not, what misconceptions does she have about this topic? Create a study guide with explanations, examples, and graphics to help clear up any misconceptions students might have over these topics.

3rd Block Robin Radical

1. Is $\sqrt{130}$ rational or irrational? Where would $\sqrt{130}$ be located on a number line? Explain your reasoning.

$\sqrt{130}$ is a rational number because 130 is even. All rational numbers are even and irrational numbers are odd when the numbers are under the square root sign. The square root sign is the opposite of squaring a number. Squaring a number is the same as raising it to the 2nd power. So, to find the value of a number under the square root sign, you divide it by 2. So, 130÷2 is 65. The answer is 65.



Source: GA Department of Education (See page 18)

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8.NS.2: Without using your calculator, label approximate locations for the following numbers on a number line.
a. π
b. -(½ x π)
c. $2\sqrt{2}$
d. $\sqrt{17}$

a. greater than 3.
b. $-(\frac{1}{2} \times \pi)$ is slightly less than −1.5.
c. $(2\sqrt{2})^2 = 4\sqrt{2} = 8$ and $3^2 = 9$, so $2\sqrt{2}$ is slightly less than 3.
d. $\sqrt{16} = 4$, so $\sqrt{17}$ is slightly greater than 4.

(Illustrative Mathematics)

8.EEI.1: This task will help students develop the meaning of negative integer exponents.

Extending the Definitions of Exponen Source: Illustrative Mathematics

8.EEI.2: Ashley and Brandon have different methods for finding square roots. Ashley's Method: To find the square root of *x*, find a number so that the product of the number and itself is *x*. For example, 2 x 2 = 4 so the square root of 4 is 2. Brandon's Method: To find the square root of *x* by ½. For example 4 x ½ = 2 so the square root of 4 is 2. Whose method is NOT correct? Explain why the method you chose is not correct.

Answer: Brandon's method is not correct. His method only works for the square root of 4. It would not work for the square root of 36. Half of 36 is 18, but the square root of 36 is 6 since 6 x 6 = 36. Ashley describes the correct way to find square roots.

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8.EEI.3: The estimated area of a field is 9×10^4 square yards and the estimated area of a second field is 4.5×10^3 square yards.

A. How many times greater is the larger field than the smaller field?
B. How many square feet is each field (write in scientific notation)?
C. If you compare the two fields in square feet, how many times greater is the larger field than the smaller field?

Answer:
Part A: Students can convert the areas from scientific notation to standard form. In doing so, they see the first field has an area of 90,000 square yards, and the second has an area of 4,500 square yards. By establishing a ratio between these two values, students can see the first field's square yardage is 20 times larger.
Part B: There are 9 square feet in a square yard. Using this information, students can scale up by a multiplier of 9 to see that there are 810,000 square feet in the first field and 40,500 square feet in the second.
Part C: The ratio of 810,000 square feet to 40,500 square feet simplifies to 20 to 1. Students should recognize this answer should match that of Part A. Though the unit of measurement being used was changed from square yards to square feet, the actual areas of both fields remains constant.

8.EEI.4: In this lesson, students make conjectures to discover how to multiply and divide numbers written in scientific notation.


National Debt.pdf

Source: Ohio Department of Education

8.EEI.7a: Solve for x: $9(3 - 2x) = 2(10 - 8x)$

Answer: $x = 3.5$ The first step to solve this equation would be to perform the distributive property to get an equivalent equation $27 - 18x = 20 - 16x$. The next step is to combine like terms by transferring them to opposite sides of the equal sign by performing the inverse operation $7 = 2x$. The next step would be to divide each side of the equation by 2 to get your solution $x = 3.5$. The final step is to make sure your solution to your equation is true by substituting your value of x into the original equation and solve.

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8.EEI.7b: Identify the type of solution you would expect from the following equation: $8(x + 4) - 7 = 13x + 25 - 5x$. Solve the problem algebraically to assess your hypothesis.

Answer: Infinitely many solutions - Students should apply the distributive property to the left side of the equation to attain $8x + 32 - 7$. By combining the like terms on each side of the equation, $8x + 25 = 8x + 25$ is attained. Students should recognize that the two sides are equivalent; if not, they should collect variables and integers on either side of the equation to get $0 = 0$. When both sides of the equation yield the same value, the result is infinitely many solutions.

8.DSP.5: Tae owns a gaming company that sells three different types of games: virtual, board, and card. He has two stores in South Carolina. The tables below display his company's sales for the two months.

STORE ONE	Virtual	Board	Card
August	152	47	63
December	219	92	81

STORE TWO	Virtual	Board	Card
August	114	81	91
December	187	120	73

Construct a matrix that displays the average sales of the two stores for August and December.

Answer: Students should add values in the two matrices. Next, they should multiply a by a scalar of ½ which would be equivalent to dividing the values by 2.

Average	Virtual	Board	Card
August	133	64	77
December	203	106	77

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