8th Grade Mathematics Map/Pacing Guide
2019-2020

Topic & Standard	
	Mathematical Practices 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.
Quarter 1	**Unit 1: The Number System** **CH 1: "Why is it helpful to write numbers in different ways?"** **The Number System** • **8.NS.1** Know that real numbers are either rational or irrational. Understand informally that every number has a decimal expansion which is repeating, terminating, or is non-repeating and non-terminating. • **8.NS.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of the expressions. **Expressions and Equations** • **8.EE.1** Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. • **8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. • **8.EE.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8; and the population of the world as 7×10^9; and determine that the world population is more than 20 times larger. • **8.EE.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology. **Unit 2: Expressions and Equations** **CH 2: "What is equivalence?"** **Expressions and Equations** • **8.EE.7** Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

SPIRAL REVIEW
- **Aleks Software:**
   a. Tier 1 and 2 students should be accessing Aleks at least 2 hours or 10 topics per week. Tier 3 students should be accessing Aleks at least 3 hours or 15 topics per week. This allows students to spiral content throughout the year.

==MAJOR== ==SUPPORTING== ==ADDITIONAL==

Students should spend the majority of learning on the major work of the grade level; which should account for at least 65% of the academic year (Achieve the core, n.d.). **Major content should be emphasized via a greater number of days of instruction, depth and mastery.**

Assessment (Evidence)	*Resources Curriculum & Textbook*	*Key Concept tools & practices*
Formative & Summative Assessments ● 4-7 tasks that reach DOK 3-4 ● At least (1) GRASPS per quarter & ● Illuminate weekly **MGraw-Hill Glencoe Assessment Resources (Formative, Pre/Post, and Summative):** ● Quick Checks ● Spiral Reviews ● Chapter Quizzes and Tests & Mid-chapter Review ● Aleks Software- *Tier 1 and 2 students should be accessing Aleks at least 2 hours or 10 topics per week. Tier 3 students should be accessing Aleks at least 3 hours or 15 topics per week.	**McGraw-Hill Glencoe, Course 3** **Mathematical Practices - 1 week** ● Review: Measurement (customary and metric); Place Value; Order of Operations; Integers; and 4-step Problem Solving **Chapter 1 Real Numbers (Lessons 1-10) 4 weeks** **Inquiry Labs & Projects:** ● Problem Solving Investigation "The 4 Step Plan" ● Scientific Notation Using Technology ● Roots of Non-Perfect Squares ● 21st Century Careers – Robotics Engineer ● Unit: Music to My Ears **Chapter 2 Equations in One Variable (Lessons 1-5) 4 weeks** **Inquiry Labs & Projects:** ● Solve Two-Step Equations ● Problem Solving Investigation "Work Backward" ● Equations with Variables on Each Side ● 21st Century Careers – Skateboard Designer ***Review Inequalities (7.EE.4b) before moving to CH 3**	**Meaning Making *Resources* embedded within each Lesson:** ● Chapter and Lesson Essential Questions ● Foldables ● Vocabulary ● Bellwork (Spiral Review) ● Real-World Link Problem ● H.O.T. Problems at the end of each lesson ● Desmos ● Gizmos **ConnectED Resources to Reinforce Teaching & Learning:** ● Unit Opening Videos ● Tutor videos ● eToolkit for virtual simulations ● LearnSmart ● Visual Vocab. Cards ● Course Glossary ● Virtual Manipulatives ● Graphic Novels ● Novels ● RTI ReTeach Lessons by Chapter ● Unit Projects

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			● *On Demand Professional Development Videos by topic / chapter

Topic & Standard
 	
 Quarter 2
	Mathematical Practices
	 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.
	
	 Unit 2 Cont: Expressions and Equations
	 CH 3 "Why are graphs helpful?"
	 Expressions and Equations
	 ● **8.EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed
	 ● **8.EE.6** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b
	 ● **8.EE.8** Analyze and solve pairs of simultaneous linear equations graphically.
	     a. Understand that the solution to a pair of linear equations in two variables corresponds to the point(s) of intersection of their graphs, because the point(s) of intersection satisfy both equations simultaneously.
	     b. Use graphs to find or estimate the solution to a pair of two simultaneous linear equations in two variables. Equations should include all three solution types: one solution, no solution, and infinitely many solutions. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.
	     c. Solve real-world and mathematical problems leading to pairs of linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. (Limit solutions to those that can be addressed by graphing.)
	 Functions

- **8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Unit 3: FUNCTIONS
CH 4 "How can we model relationships between quantities?"
Functions

- **8.F.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output (Function notation is not required in Grade 8).
- **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
- **8.F.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.
- **8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- **8.F.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph, e.g., where the function is increasing or decreasing, linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

SPIRAL REVIEW

- **Aleks Software:**
    a. Tier 1 and 2 students should be accessing Aleks at least 2 hours or 10 topics per week. Tier 3 students should be accessing Aleks at least 3 hours or 15 topics per week. This allows students to spiral content throughout the year.

MAJOR SUPPORTING ADDITIONAL

Students should spend the majority of learning on the major work of the grade level; which should account for at least 65% of the academic year (Achieve the core, n.d.). **Major content should be emphasized via a greater number of days of instruction, depth and mastery.**

Assessment (Evidence)	*Resources (Curriculum /Textbook)*	*Concept Tools & Practices*
Formative & Summative Assessments ● 4-7 tasks that reach DOK 3-4 ● At least (1) GRASPS per quarter ● Illuminate weekly **MGraw-Hill Glencoe Assessment Resources (Formative, Pre/Post, and Summative):**	McGraw-Hill Glencoe, Course 3 **CHAPTER 3: Equations in Two Variables (Lessons 1-7) (4.5 WEEKS)** **Inquiry Labs & Projects:** ● Problem Solving Investigation "The 4 Step Plan" ● Scientific Notation Using Technology ● Roots of Non-Perfect Squares	**Meaning Making *Resources* embedded within each Lesson:** ● Chapter and Lesson Essential Questions ● Foldables ● Vocabulary ● Bellwork (spiral review) ● Real-World Link Problem ● H.O.T. Problems at the end of each lesson ● Desmos

● Quick Checks ● Spiral Reviews ● Chapter Quizzes and Tests & Mid-chapter Review ● Aleks Software- *Tier 1 and 2 students should be accessing Aleks at least 2 hours or 10 topics per week. Tier 3 students should be accessing Aleks at least 3 hours or 15 topics per week.	● 21st Century Careers – Robotics Engineer ● Unit: Web design 101 ***Only teach systems of equations through graphing** **CHAPTER 4: Functions (Lessons 1-9) 4.5 WEEKS** **Inquiry Labs & Projects:** ● Solve Two-Step Equations ● Problem Solving Investigation "Work Backward" ● Equations with Variables on Each Side ● 21st Century Careers – Skateboard Designer ● Unit: Green Thumb ***Function notation is NOT required.**	● Gizmos **ConnectED Resources to Reinforce Teaching & Learning:** ● Unit Opening Videos ● Tutor videos ● eToolkit for virtual simulations ● LearnSmart ● Visual Vocab. Cards ● Course Glossary ● Virtual Manipulatives ● Graphic Novels ● Novels ● RTI ReTeach Lessons by Chapter ● Unit Projects ● *On Demand Professional Development Videos by topic/chapter

Topics & Standards **Quarter 3**	**Mathematical Practices** 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. **Unit of Study 4: Geometry** **CH 5 "How can Algebraic Concepts be applied to Geometry?"** **Geometry** ● **8.G.6** Analyze and justify an informal proof of the Pythagorean Theorem and its converse. ● **8.G.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world & mathematical problems in 2 & 3 dimensions. ● **8.G.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **Functions** ● **8.F.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.[1] ● **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions*). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* ● **8.F.3** Interpret the equation *y = mx + b* as defining a linear function, whose graph is a straight line; give examples of functions that are not

linear. *For example, the function A = s² giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*

- **8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two *(x, y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

CH 6: "How can we best show or describe the change in position of a figure?"
Geometry
- **8.G.1** Verify experimentally the properties of rotations, reflections, and translations (include examples of both with and without coordinates.)
  a. Lines are taken to lines, and line segments are taken to line segments of the same length.
  b. Angles are taken to angles of the same measure.
  c. Parallel lines are taken to parallel lines.
- **8.G.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

CH 7: "How can you determine congruence and similarity?"
Geometry
- **8.G.1** Verify experimentally the properties of rotations, reflections, and translations (include examples of both with and without coordinates.)
  a. Lines are taken to lines, and line segments are taken to line segments of the same length.
  b. Angles are taken to angles of the same measure.
- **8.G.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, & translations; given 2 congruent figures, describe a sequence that exhibits the congruence between them. Include ex both with and without coordinates.
- **8.G.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. Include examples both with and without coordinates.
- **8.G.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- **8.G.6** Analyze and justify an informal proof of the Pythagorean Theorem and its converse.

CH 8: "Why are formulas so important in Math and Science?"
Geometry
- **8.G.9** Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres.

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		• Nets of Cones • Changes in Scale • 21st Century: Architecture • Unit Project: Design that Ride	
Topics & Standards **Quarter 4**	**Mathematical Practices** 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. **Unit 5: Statistics and Probability** **CH 9: "How are patterns used when comparing two quantities?"** **Statistics and Probability**		

- **8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive, negative, or no associations and linear association and nonlinear association. **(GAISE 3 & 4)**
- **8.SP.2** Understand that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **(GAISE 3 & 4)**
- **8.SP.3** Use the equation of a linear model to solve problems in the contest of bivariate measurement data, interpreting the slope & intercept.**(GAISE 3&4)**
- **8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subject.

Gaise Model:
- **Step 1: Formulate the Question**
  - Students should pose their own statistical question of interest (Level C).
  - Students are starting to form questions that allow for generalizations of a population (Level B-C).
- **Step 2: Collect Data**
  - Students should begin to use random selection or random assignment (Level B).
- **Step 3: Analyze Data**
  - Students measure variability within a single group using MAD, IQR, and/or standard deviation (Level A).
  - Students compare measures of center and spread between groups using displays and values (Level B).
  - Students describe potential sources of error (Level B).
  - Students understand and use particular properties of distributions as tools of analysis moving toward using global characteristics of distributions (Level B-C).
- **Step 4: Interpret Results**
  - Students acknowledge that looking beyond the data is feasible by interpreting differences in shape, center, & spread (Level B).
  - Students determine if a sample is representative of a population and start to move towards generalization (Level B-C).
  - Students note the difference between two groups with different conditions (Level B).

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