

7th Grade Math Curriculum Map 2013-2014

Focus Topic 1 – Add and Subtract Rational Numbers (3 weeks)

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

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

Learning Target(s):

- I can describe situations in which opposite quantities combine to make 0.
- 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.

Learning Target(s):

- I can show that a number and its opposite have a sum of 0 (are additive inverses).
- I can interpret sums of rational numbers by describing real-world contexts.
- I can describe a sum when adding positive or negative numbers as a distance on a number line.
- 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.

Learning Target(s):

- I can show that the distance between two rational numbers on the number line is the absolute value of their difference.
- I can apply the principle of an additive inverse in a real-world context.
- d. Apply properties of operations as strategies to add and subtract rational numbers.

Learning Target(s):

- I can apply properties of operations as strategies to add and subtract rational numbers.

Vocabulary: additive inverse, double number line diagram, equivalent ratios, properties of operations, ratio, tape diagram, unit rate

Instructional Notes:

- Focus on interpreting and understanding operations. (7.NS.A.1)

Instructional Resources:

- Formative Assessment Lessons for Mathematics: <http://map.mathshell.org/materials/lessons.php>
- Formative Assessment Tasks for Mathematics: <http://map.mathshell.org/materials/tasks.php>
- Illustrative Mathematics: <http://www.illustrativemathematics.org/standards/k8>
- NCTM Illuminations: <http://illuminations.nctm.org/>

- PARCC: <http://www.parcconline.org/mcf/mathematics/parcc-model-content-frameworks-browser>
- Inside Mathematics: <http://insidemathematics.org/index.php/mathematical-content-standards>
- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment, and some of the multiple choice questions will be on the no-calculator portion of the assessment.
- The Foundation Topic will have 3 multiple choice questions on the proficiency assessment, and some of the multiple choice questions will be on the no-calculator portion of the assessment.
- Foundational standards should be formatively assessed early in the cycle to identify foundational gaps of students.

Focus Topic 2 – Multiply and Divide Rational Numbers (3 Weeks)

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

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

Learning Target(s):

- I can multiply rational numbers.
- I can 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.

Learning Target(s):

- I can divide with integers, provided that the divisor is not 0.
- I can interpret quotients of rational numbers by describing real-world contexts.

- c. Apply properties of operations as strategies to multiply and divide rational numbers.

Learning Target(s):

- I can apply properties of operations as strategies to multiply and divide rational numbers.
- I can apply the order of operations 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.

Learning Target(s):

- I can convert a rational number to a decimal.
- I can explain that a rational number in its decimal form ends in 0 or repeats.

Focus Topic 3 – Applications Involving Rational Numbers (2 Weeks)

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

Learning Target(s):

- I can add rational numbers in real-world and mathematical problems.
- I can subtract rational numbers in real-world and mathematical problems.
- I can multiply rational numbers in real-world and mathematical problems.
- I can divide rational numbers in real-world and mathematical problems.

Vocabulary: algebraic expression, arithmetic operations, coefficient, complex fraction, order of operations

Instructional Notes:

- Computations with rational numbers extend the rules for manipulating fractions to complex fractions. (7.NS.A.3)

Instructional Resources:

- Formative Assessment Lessons for Mathematics: <http://map.mathshell.org/materials/lessons.php>
- Formative Assessment Tasks for Mathematics: <http://map.mathshell.org/materials/tasks.php>
- Illustrative Mathematics: <http://www.illustrativemathematics.org/standards/k8>
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- Inside Mathematics: <http://insidemathematics.org/index.php/mathematical-content-standards>
- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment, and some of the multiple choice questions will be on the no-calculator portion of the assessment.
- The Focus Topic will have 1 extended response on the proficiency assessment.
- The Foundation Topic will have 3 multiple choice questions on the proficiency assessment.
- Foundational standards should be formatively assessed early in the cycle to identify foundational gaps of students.

Focus Topic 4 – Generate Equivalent Expressions (2 Weeks)

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

Learning Target(s):

- I can apply properties of operations to add and subtract linear expressions with rational coefficients.
- I can apply properties of operations to factor linear expressions with rational coefficients.
- I can apply properties of operations to expand linear expressions with rational coefficients.

7.EE.A.2 – Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”*

Learning Target(s):

- I can rewrite an expression in an equivalent form.
- I can explain how two equivalent quantities are related.

Vocabulary: equivalent expressions, linear expressions, rational coefficients

Instructional Notes:

- Creating and interpreting equivalent expressions is an excellent time to remind students of the concept of the “equals” sign functioning as a balance scale. (7.EE.A.2)

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- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment, and some of the multiple choice questions will be on the no-calculator portion of the assessment.

Focus Topic 5 –Solve Applications; Apply the Properties of Operations

(3Weeks)

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

Learning Target(s):

- I can solve multi-step, real-world and mathematical problems with any form of positive and negative rational numbers using tools strategically.
- I can apply the properties of operations, converting between forms as appropriate, to solve real-world and mathematical problems.
- I can justify if an answer is reasonable by using mental computation and estimation strategies.

Vocabulary: equivalent forms, properties of operations

Instructional Notes:

- Creating and interpreting equivalent expressions is an excellent time to remind students of the concept of the “equals” sign functioning as a balance scale. (7.EE.B.3)

Instructional Resources:

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- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment, and some of the multiple choice questions will be on the no-calculator portion of the assessment.
- The Focus Topic will have 1 short answer on the proficiency assessment.

Focus Topic 6 – Create and Solve Equations and Inequalities in Applications (3 Weeks)

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

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

Learning Target(s):

- I can solve equations in the form $px + q = r$ with speed and accuracy.
- I can identify the sequence of operations used to solve an equation of the form $px + q = r$ and $p(x + q) = r$.
- I can compare the sequence of operations in an algebraic solution to an arithmetic solution.

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

Learning Target(s):

- I can solve inequalities of the form $px + q > r$ or $px + q < r$.
- I can graph the solution set of an inequality.
- I can interpret the solution set of an inequality in the context of a word problem.

Vocabulary: algebraic solution, arithmetic solution, equation, inequality, solution set, variable

Instructional Notes:

- Solving equations and inequalities can be coherently connected to the concept of a balance scale. (7.EE.B.4)

Instructional Resources:

- Formative Assessment Lessons for Mathematics: <http://map.mathshell.org/materials/lessons.php>
- Formative Assessment Tasks for Mathematics: <http://map.mathshell.org/materials/tasks.php>
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Focus Topic 7 – Unit Rate/ Ratios/ Proportions (2 Weeks)

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

Learning Target(s):

- I can compute unit rates with fractional values.
- I can compute unit rates with ratios of lengths and areas.
- I can compute unit rates in like or different units of measure.

7.G.A.1 – Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Learning Target(s):

- I can create a scale drawing using a different scale.
- I can calculate the missing length in a scale drawing using proportional reasoning.
- I can calculate the area of a scale drawing using proportional reasoning.
- I can describe the relationship between two given figures.

Vocabulary: fraction, ratio, scale, scale drawing, scale factor, unit rate

Instructional Notes:

- For this Focus Topic, instruction should include students computing unit rates with quantities other than length and area. (7.RP.A.1)
- For this Focus Topic, instruction around 7.G.A.1, specifically scale factor, could coherently reinforce instruction around 7.RP.A.1 .

Instructional Resources:

- Formative Assessment Lessons for Mathematics: <http://map.mathshell.org/materials/lessons.php>
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- Inside Mathematics: <http://insidemathematics.org/index.php/mathematical-content-standards>
- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment.

Focus Topic 8 – Proportional Relationships in Graphs, Tables, and Equations

(3 Weeks)

7.RP.A.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.

Learning Target(s):

- I can analyze two ratios to determine if they are proportional by examining a graph and observing whether the graph is a straight line through the origin.
- I can analyze two ratios to determine if they are proportional by examining a table and identifying whether the line crosses through the point $(0, 0)$.

- b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Learning Target(s):

- I can analyze tables to identify the unit rate of a proportional relationship.
- I can analyze graphs to identify the unit rate of a proportional relationship.
- I can analyze equations to identify the unit rate of a proportional relationship.
- I can analyze diagrams to identify the unit rate of a proportional relationship.
- I can analyze verbal descriptions to identify the unit rate of a proportional relationship.

- 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 $t = pn$.*

Learning Target(s):

- I can write an equation to represent a proportional relationship.

- 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.

Learning Target(s):

- I can explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.
- I can explain a proportional relationship with consideration to points $(0, 0)$ and $(1, r)$, where r is the unit rate.

Focus Topic 9 – Proportional Relationships in Ratio and Percent Problems

(3 Weeks)

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

Learning Target(s):

- I can apply proportional reasoning to solve real world multistep ratio and percent problems.

Vocabulary: commission, gratuities, markup, markdown, percent error, percent of decrease, percent of increase, proportion, proportional relationship, simple interest, tax

Instructional Notes:

- For 7.RP.A.3, instructional strategies should be intentional about using proportional reasoning as a strategy for solving percent problems.

Instructional Resources:

- Formative Assessment Lessons for Mathematics: <http://map.mathshell.org/materials/lessons.php>
- Formative Assessment Tasks for Mathematics: <http://map.mathshell.org/materials/tasks.php>
- Illustrative Mathematics: <http://www.illustrativemathematics.org/standards/k8>
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- Inside Mathematics: <http://insidemathematics.org/index.php/mathematical-content-standards>
- New York State: <http://www.engageny.org/mathematics>

Assessment Notes:

- The Focus Topic will have 3 multiple choice questions on the proficiency assessment.
- The Focus Topic will have 1 extended response on the proficiency assessment.

Focus Topic 10 – Random Sampling for Drawing Inferences about Populations (2 Weeks)

7.SP.A.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.

Learning Target(s):

- I can make generalizations when a sample of a population is a valid representative.
- I can apply statistics from a sample to gain information about a population.
- I can identify characteristics of a sample that are representative of that population.

7.SP.A.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.*

Learning Target(s):

- I can analyze statistical data to draw inferences from a sample population with an unknown characteristic of interest.
- I can generate random samples of appropriate size for a population to gauge the variation.

7.SP.B.3 – Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, 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.*

Learning Target(s):

- I can compare two distributions on a graph by visually comparing their displays.
- I can compare the measures of center in data distributions by measuring the difference between the centers.

7.SP.B.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.*

Focus Topic 11 – Investigate Chance Processes; Problem Models (2 Weeks)

7.SP.C.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 $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Learning Target(s):

- I can express probability as a number between 0 and 1.
- I recognize a probability of $\frac{1}{2}$ as neither likely nor unlikely to occur.
- I recognize that as a probability moves closer to 1 that it is more likely to occur.
- I recognize that as a probability moves closer to 0 it is less likely to happen.

7.SP.C.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.*

Learning Target(s):

- I can predict the approximate probability for an event.
- I can determine relative frequency by comparing the approximate probability to the actual probability after collecting data.

7.SP.C.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.*

Learning Target(s):

- I can design a uniform probability model.
 - I can use a uniform probability model to determine the probability of events.
- b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *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?*

Focus Topic 12 – Problems Involving Angle Measure, Surface Area, and Volume

(4 Weeks)

7.G.A.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.

Learning Target(s):

- I can construct triangles from three given angle measures resulting in unique triangles by drawing free-hand or using rulers, protractors, or technology.
- I can construct triangles from three given angle measures resulting in more than one triangle by drawing free-hand or using rulers, protractors, or technology.
- I can construct triangles from three given angle measures resulting in no triangles by drawing free-hand or using rulers, protractors, or technology.

7.G.A.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.

Learning Target(s):

- I can describe the two-dimensional figures that result from slicing a 3-D figure.

7.G.B.4 – Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Learning Target(s):

- I can apply the formula for area of a circle to solve problems.
- I can apply the formula for circumference to solve problems.
- I can find the area of a circle given the circumference.
- I can find the circumference of a circle given the area.
- I can describe and justify the relationship between area and circumference of a circle.

7.G.B.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.

Learning Target(s):

- I can identify and recognize types of angles: supplementary, complementary, vertical, adjacent.
- I can calculate the complement and supplement of a given angle.
- I can determine an unknown angle measure by writing and solving equations based upon relationships among angles.

