# Common Core Math Curriculum  Grade 7

## Essential Questions

<table>
<thead>
<tr>
<th>What are the properties of operations?</th>
<th>Expressions &amp; Equations 7.EE Use properties of operations to generate equivalent expressions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you translate real-world problems to algebraic expressions?</td>
<td>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</td>
</tr>
<tr>
<td>What is the difference between a rational and irrational number?</td>
<td>What are the properties of operations? How do you translate real-world problems to algebraic expressions?</td>
</tr>
<tr>
<td>What is the Distributive Property?</td>
<td>Geometry 7.G Draw construct, and describe geometrical</td>
</tr>
<tr>
<td>How do you compare algebraic solutions to arithmetic solutions?</td>
<td>Use properties of operations to generate equivalent expressions.</td>
</tr>
</tbody>
</table>

### Grade 7 Skill

- Add linear expressions with rational coefficients. 7.EE.1
- Subtract linear expressions with rational coefficients. 7.EE.1
- Factor linear expressions with rational coefficients. 7.EE.1
- Expand linear expressions with rational coefficients. 7.EE.1
- Apply properties of operations to all operations with rational coefficients. 7.EE.1
- Translate word situations to algebraic expressions. 7.EE.1
- Identify the GCF of rational coefficients in linear expressions. 7.EE.1
- Translate words to expressions 7.EE.2
- Translate situation problems to algebraic expressions. 7.EE.2
- Simplify expressions 7.EE.2
- Rewrite expressions to help analyze problems 7.EE.2
- Explain how an equivalent expression relates to the original situation problem. 7.EE.2
- Solve multi-step real-world problems involving all types of rational numbers. 7.EE.3
- Justify the reasonableness of solutions using mental computation and estimation. 7.EE.3
- Apply properties of operations to solve multi-step real-world problems with all rational numbers. 7.EE.3
- Convert fluently between forms for common decimals, fractions, and percents. 7.EE.3
- Explain the connection between different forms of equivalent rational numbers. 7.EE.3
- Construct and solve two step linear equations from real-world problems. 7.EE.4a
- Translate verbal situations to two step linear equations. 7.EE.4a
- Solve two step linear equations 7.EE.4a
- Explain the steps used in solving the equation. 7.EE.4a
- Solve two step linear equations fluently. 7.EE.4a
- Identify the sequence of operations used to solve a problem. 7.EE.4a
- Compare algebraic solutions to arithmetic solutions. 7.EE.4a
- Construct and solve two step linear inequalities from real-world problems. 7.EE.4b
- Graph the solution set of two step linear inequalities from real-world problems. 7.EE.4b
- Interpret and describe the solution in the context of the problem. 7.EE.4b
- Identify when the inequality symbol changes to its opposite. 7.EE.4b
- Explain why an open or closed dot is used on a number line. 7.EE.4b
- Write a linear inequality from a given graph. 7.EE.4b
- Compute the actual length of a figure from a scale drawing. 7.G.1
- Compute the actual area of a figure from a scale drawing. 7.G.1

### Vocabulary

- Rational
- Coefficients
- Factor
- GCF
- properties of operations
- Constant
- Like Terms
- Monomial
- Variable
- Expressions
- rational numbers
- estimation
- mental computation
- integers
- fractions
- decimals
- equivalent
- algebraic solution
- arithmetic solution
- two-step linear equations
- Property of Equality
- Inverse Operations
- Linear equations
- Distributive Property
- two-step linear inequalities
- At least
- At most
- ≤, <, >, ≥
- Inequalities
- Number line

### Mathematical Practices

- Make sense of problems and preserve in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics. Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

### Assessment

- http://www.nctm.org
- Performance Tasks
- Investigations
- Math Journaling
| How do you describe triangles? | Figures and describe the relationships between them. | - Apply a scale from one drawing to create a second scale for that drawing. 7.G.1  
- Solve problems involving scale drawings of geometric figures. 7.G.1  
- Construct a triangle (freehand, with ruler and protractor, and technology) given three angle measures. 7.G.2  
- Construct a triangle (freehand, with ruler and protractor, and technology) given three side measures. 7.G.2  
- Construct a geometric shape given side lengths/angle measures. 7.G.2  
- Describe when angle measures determine a triangle (given angles equal 180°) or no triangle (given angles are greater or less than 180°). 7.G.2  
- Describe when side measures determine a unique triangle (a+b>c) or no triangle (a+b ≤ c). 7.G.2  
- Define two-dimensional figures that result from slicing a right rectangular prism. 7.G.3  
- Define two-dimensional figures that result from slicing a right rectangular pyramid. 7.G.3  
- Define two-dimensional figures that result from slicing a triangular pyramid. 7.G.3  
- Define two-dimensional figures that result from slicing a cube. 7.G.3  
- Define two-dimensional figures that result from slicing a cylinder. 7.G.3  
- Define two-dimensional figures that result from slicing a cone. 7.G.3  
- Derive the relationship between the circumference and area of a circle. (A = \(\pi r^2\); Area of a circle = half the circumference times the radius.) Example: C = 16π find the area. 7.G.4  
- Solve problems utilizing the circumference of a circle formula. 7.G.4  
- Solve problems utilizing the area of a circle formula. 7.G.4  
- Define supplementary, complementary, vertical, and adjacent angles. 7.G.5  
- Solve for an unknown angle in a figure utilizing definitions of supplementary, complementary, vertical, and adjacent angles. 7.G.5  
- Solve area, volume, and surface area problems of two- and three-dimensional objects from real-world situations. 7.G.6  
- Explain how statistics is used to gain information about a population. 7.SP.1  
- Evaluate the validity of a statistical sample from a population. 7.SP.1  
- Explain why random sampling produces a sample representative of a population. 7.SP.1  
- Draw inferences about a population with a certain characteristic from data gathered from a random sample. 7.SP.2  
- Gather data from multiple random samples of the same size in reference to a certain characteristic. 7.SP.2  
- Describe the variability of two numerical data sets 7.SPP.3 |  |
| How do you solve problems using formulas? | Statistics & Probability 7.SP  
Use random sampling to draw inferences about a population.  
Draw informal comparative  
Closed dot  
Open dot  
Solution set  
Graph the solution set  |
|  | - Scale drawing  
- Area  
- Lengths  
- Geometric figures  
- Triangle inequality theorem  
- Triangle angle sum theorem  
- Geometric figures  
- Uniquely defined triangle  
- Ambiguously defined triangle  
- Nonexistent triangle  
- Slice  
- Two-dimensional figures  
- Pyramid  
- Rectangular prism  
- Cylinder  
- Triangular pyramid  
- Cube, cone, circle  
- Circumference  
- Area  
- Diameter  
- Radius  
- Vertical angles  
- Supplementary  
- Complementary  
- Adjacent angles  
- Volume  
- Surface area  
- Two- and three-dimensional figures |
How do you explain real-world problems using statistics?

- Compute the mean absolute deviation, range, and interquartile range. 7.SP.3
- Describe how many times larger/smaller the variability of one data set is to another. 7.SP.3
- Read and interpret data from statistical representations (box-and-whisker plot, line/dot plot). 7.SP.3
- Compare/contrast measures of central tendency to draw conclusions about two random samples. 7.SP.4
- Compare/contrast variability of two data sets to draw conclusions about two random samples. 7.SP.4
- Read and interpret data from statistical representations (box-and-whisker plot, line/dot plot). 7.SP.4
- Define probability as number between 0 and 1. 7.SP.5
- Describe a situation in which the event is unlikely. 7.SP.5
- Identify the probability of an unlikely event as a number near 0. 7.SP.5
- Describe a situation in which the event is likely. 7.SP.5
- Identify the probability of a likely event as a number near 1. 7.SP.5
- Describe a situation in which the event is neither likely nor unlikely. 7.SP.5
- Identify the probability of an event that is neither likely nor unlikely as a number near \( \frac{1}{2} \). 7.SP.5
- Predict the number of times an event occurs by multiplying the theoretical probability by the number of trials. 7.SP.6
- Compute the experimental probability of an event occurring through repeated trials. 7.SP.6
- Compare the theoretical probability of an event occurring and the experimental probability. 7.SP.6
- Predict future probabilities based on data collected. 7.SP.6
- Create a uniform probability model (a situation in which all outcomes are equally likely). 7.SP.7a
- Calculate simple probabilities of events. 7.SP.7a
- Design an experiment to investigate the likelihood of an outcome. 7.SP.7b
- Compare the results of a series of trials and draw conclusions. 7.SP.7b
- Calculate compound probabilities. 7.SP.8a
- Determine the total number of possible outcomes (sample space or Counting Principle). 7.SP.8a
- Define compound probabilities as fractions of the sample space taken from. 7.SP.8a
- Construct a tree diagram, list, or table to illustrate all possible outcomes of a compound event. 7.SP.8b
- Calculate the probability of a compound event based on a table, list, or tree diagram. 7.SP.8b

How do you interpret data from statistical representations?

- Investigate chance processes and develop, use, and evaluate probability models.
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- Calculate the probability of a compound event based on a table, list, or tree diagram. 7.SP.8b

How do you predict future probabilities based on data?

- What is the constant of proportionality?

- How do you use formulas to solve proportional

- Population
- Sample
- Representative sample
- Biased sample
- Random sampling
- Inferences
- Validity
- Inference
- Random sampling
- Population
- Characteristic

- variability (how far away from the mean)
- mean absolute deviation
- range
- outlier
- interquartile range
- measures of central tendency (mean, median, mode)
- variability

- Probability
- Event
- Likely event
- Unlikely event
- Outcomes
- Possible outcomes
- Favorable outcomes
- Theoretical probability
- Experimental probability
- Trials
- simple probability
<table>
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<th><strong>relationships?</strong></th>
<th><strong>How do you apply properties to solve rational numbers problems?</strong></th>
<th><strong>How can a negative symbol be written in a fraction?</strong></th>
<th><strong>How do you multiply and divide rational numbers?</strong></th>
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<td>✓ Design a simulation to generate data for compound events. 7.SP.8c</td>
<td>✓ Calculate the probability of a compound event from data generated in a simulation. 7.SP.8c</td>
<td>✓ Solve unit rate problems that have fractional quantities. (Problems may require solving complex fractions). 7.RP.1</td>
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<td>✓ Calculate the probability of a compound event from data generated in a simulation. 7.SP.8c</td>
<td>✓ Solve ratio problems whose quantities are lengths of the same unit and different units. 7.RP.1</td>
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<td>✓ Solve ratio problems whose quantities are areas of the same unit and different units. 7.RP.1</td>
<td>✓ Divide two fractions by taking the reciprocal of the divisor. 7.RP.1</td>
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<td>✓ Solve ratio problems of other quantities with the same unit and different units. 7.RP.1</td>
<td>✓ Compute the unit rate. 7.RP.1</td>
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<td>✓ Calculate the cross product to determine if the two ratios are in proportion (equivalent). 7.RP.2a</td>
<td>✓ Analyze ratios in a table to determine if the ratios are equivalent by finding the constant of proportionality (slope). 7.RP.2a</td>
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<td>✓ Graph ratios on a coordinate plane to determine if the ratios are proportional by observing if the graph is a straight line through the origin ( y = mx ), where ( m ) is the slope/constant of proportionality. 7.RP.2a</td>
<td>✓ Solve proportions by cross multiplication. 7.RP.2a</td>
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<td>✓ Write and solve proportions. 7.RP.2a</td>
<td>✓ Calculate the constant of proportionality/unit rate from a table or diagram. 7.RP.2b</td>
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<td>✓ Compute the rate of change/slope from a graph (rise over run) or equation ( m = \frac{y2 - y1}{x2 - x1} ). 7.RP.2b</td>
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<td>✓ Calculate the constant of proportionality/unit rate given a verbal description of a proportional relationship 7.RP.2b</td>
<td>✓ Write an equation from a proportional relationship. 7.RP.2c</td>
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<tr>
<td>✓ Solve equations created from proportional relationships. 7.RP.2c</td>
<td>✓ Define the rate of proportionality from a graph. 7.RP.2d</td>
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<td>✓ Explain the meaning of a point on a graph ( y = mx ) of a real life situation. 7.RP.2d</td>
<td>✓ Calculate the unit rate by identifying that on a graph when the x-coordinate is 1, the y-coordinate is the unit rate. 7.RP.2d</td>
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<td>✓ Solve multistep ratio problems using proportions. Focus on simple interest, tax, markups/downs, gratuities and commissions, fees, percent increase/decrease, and percent error. 7.RP.3</td>
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**Diocese of Buffalo, 2012**

Common Core Math – Gr. 7
### 7.NS.1a
- Describe real world situations where two quantities add to make a sum of zero.
- Define the sum of two rational numbers as the distance one addend is away from the total by the absolute value of the other addend. 7.NS.1b
- Define the direction of the distance on a number line based on the sign of the addend. Negative is left/down and positive is right/up. 7.NS.1b
- Define additive inverse as a rational number added to its negative which results in a sum of zero. 7.NS.1b
- Solve real world problems involving adding rational numbers. 7.NS.1b
- Compare subtracting rational numbers to adding the additive inverse. 7.NS.1c
- Prove that the distance between two rational numbers is equal to the absolute value of their difference. 7.NS.1c
- Solve real world problems describing the skill above 7.NS.1c
- Apply commutative, associative, additive inverse, and distributive properties to solve addition and subtraction of rational numbers. 7.NS.1d

Apply and extend the commutative, associative, multiplicative inverse, and distributive property of multiplication from fractions to rational numbers. Focus on the distributive property. 7.NS.2a

- Prove the rules for multiplying signed numbers by applying the distributive property. 7.NS.2a
- Solve real-world problems involving signed numbers. 7.NS.2a
- Define the quotient of two integers (divisor not = 0) as a rational number. 7.NS.2b
- Solve real word problems involving division of rational numbers. 7.NS.2b
- Explain that a negative symbol can be written in the numerator, denominator, or next to the fraction without changing the value of the fraction. 7.NS.2b
- Multiply and divide rational numbers by applying commutative, associative, and distributive properties. 7NS.2c
- Divide the numerator of a fraction by its denominator using long division. 7.NS.2d
- Define a rational number as a decimal that terminates or eventually repeats. 7.NS.2d
- Solve real world problems involving all four operations with rational numbers. 7.NS.3