Seventh Grade Math Standards and "I Can Statements"

Standard - CC.7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.

- I can compute unit rates associated with ratios of fractions in like or different units
- I can compute fractional by fractional quotients
- I can apply fractional ratios to describe rates

Standard - CC.7.RP.2a Recognize and represent proportional relationships between quantities. 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.

- I can determine that a proportion is a statement of equality between two ratios
- I can analyze two ratios to determine if they are proportional to one another with a variety of strategies (e.g. using tables, graphs, pictures, etc.)

CC.7.RP.2b Recognize and represent proportional relationships between quantities. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

- I can define constant of proportionality as a unit rate
- I can analyze tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships to identify the constant of proportionality

CC.7.RP.2c Recognize and represent proportional relationships between quantities. 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.

- I can represent proportional relationships by writing equations

CC.7.RP.2d Recognize and represent proportional relationships between quantities. 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.

- I can recognize what (0,0) represents on the graph of a proportional relationship
- I can recognize what (1,*r*) on a graph represents, where *r* is the unit rate
- I can explain what the points on a graph of a proportional relationship means in terms of a specific situation

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

- I can recognize situations in which percentage proportional relationships apply
- I can apply proportional reasoning to solve multistep ratio and percent problems, *e.g., simple interest, tax, markups, markdowns, gratuities, commissions, fees, percent increase and decrease, percent error, etc.*

Standard - CC.7.NS.1a 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. 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.

- I can describe situations in which opposite quantities combine to make 0
- I can apply the principal of subtracting rational numbers in real-world contexts

CC.7.NS.1b 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. 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.

- I can represent and explain how a number and its opposite have a sum of 0 and are additive inverses
- I can demonstrate and explain how adding two numbers, $p + q$, if q is positive, the sum of p and q will be lql spaces to the right of p on the number line
- I can demonstrate and explain how adding two numbers, $p + q$, if q is negative, the sum of p and q will be lql spaces to the left of p on the number line
- I can interpret sums of rational numbers by describing real-world contexts
- I can explain and justify why the sum of $p + q$ is located a distance of lql in the positive or negative direction from p on a number line
- I can represent the distance between two rational numbers on a number line is the absolute vale of their difference and apply this principal in real-world contexts
- I can apply properties of operations as strategies to add and subtract rational numbers

CC.7.NS.1c 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. 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.

- I can identify subtraction of rational numbers as adding the additive inverse property to subtract rational numbers, p-q= p+ (-q)
- I can apply and extend previous understanding to represent addition and subtraction problems of rational numbers with a horizontal or vertical number line
- I can apply properties of operations as strategies to add and subtract rational numbers

CC.7.NS.1d 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. Apply properties of operations as strategies to add and subtract rational numbers.

- I can identify properties of addition and subtraction when adding and subtracting rational numbers
- I can apply properties of operations as strategies to add and subtract rational numbers

Standard - CC.7.NS.2a Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 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.

- I can recognize that the process for multiplying fractions can be used to multiply rational numbers including integers
- I can recognize and describe the rules when multiplying signed numbers
- I can apply the properties of operations, particularly distributive property, to multiply rational numbers
- I can interpret the products of rational numbers by describing real-world contexts

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

- I can explain why integers can be divided except when the divisor is 0
- I can describe why the quotient is always a rational number
- I can comprehend and describe the rules when dividing signed numbers, integers
- I can recognize that $-(p/q) = -p/q = p/-q$
- I can interpret the quotient of rational numbers by describing real-world contexts

CC.7.NS.2c Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. Apply properties of operations as strategies to multiply and divide rational numbers.

- I can identify how properties of operations can be used to multiply and divide rational numbers (such as distributive property, multiplicative inverse property, multiplicative identity, commutative property for multiplication, associative property for multiplication, etc.)
- I can apply properties of operations as strategies to multiply and divide rational numbers

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

- I can convert a rational number to a decimal using long division
- I can explain the decimal form of a rational number terminates (stops) in zeroes or repeats

Standard - CC.7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)

- I can add rational numbers
- I can subtract rational numbers
- I can multiply rational numbers
- I can divide rational numbers
- I can solve real-world mathematical problems by adding, subtracting, multiplying, and dividing rational numbers, including complex fractions

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

- I can combine like terms with rational coefficients
- I can factor and expand linear expressions with rational coefficients using the distributive property
- I can apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients

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

- I can write equivalent expressions with fractions, decimals, percents, and integers
- I can rewrite an expression in a equivalent form in order to provide insight about how quantities are related in a problem context

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

- I can convert between numerical forms as appropriate
- I can 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
- I can apply properties of operations to calculate with numbers in any form
- I can assess the reasonableness of answers using mental computation and estimation strategies

Standard - CC.7.EE.4a 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. 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?

- I can identify the sequence of operations used to solve an algebraic equation of the form $px + q=r$ and $p(x + q) = r$
- I can fluently solve equations of the form $px + q=r$ and $p(x + q) = r$ with speed and accuracy
- I can 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
- I can compare an algebraic solution to an arithmetic solution by 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 the width? This can be answered algebraically by using only the formula for perimeter (P=21+2w) to isolate w or by finding an arithmetic solution by substituting values into the formula*

Standard - CC.7.EE.4b 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. 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.

- I can graph the solution set of the inequality of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers
- I can use variables and construct equations to represent quantities of the form $px + q = r$ and $p(x + q) = r$ from real-world and mathematical problems
- I can 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
- I can interpret the solution set of an inequality in the context of the problem

Standard - CC.7.G.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.

- I can use ratios and proportions to create scale drawing
- I can identify corresponding sides of scaled geometric figures
- I can compute lengths and areas from scale drawings using strategies such as proportions
- I can solve problems involving scale drawings of geometric figures using scale factors
- I can reproduce a scale drawing that is proportional to a given geometric figure using a different scale

Standard - CC.7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

- I can determine which conditions create unique triangles, more than one triangles, or no triangle
- I can analyze given conditions based on the three measures of angles or sides of a triangle to determine when there is a unique triangle, more than one triangle or no triangle
- I can construct triangles from three given angle measures to determine when there is a unique triangle, more than one triangle or no triangle using appropriate tools (freehand, rulers, protractors, and technology)
- I can construct triangles from three given side measures to determine when there is a unique triangle, more than one triangle or no triangle using appropriate tools (freehand, rulers, protractors, and technology)

Standard - CC.7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

- I can define slicing as the cross-section of a 3D figure
- I can describe the two-dimensional figures that result from slicing a three-dimensional figure such as a right rectangular prism or pyramid
- I can analyze three-dimensional shapes by examining two dimensional cross-sections

Standard - CC.7.G.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.

- I can determine the parts of a circle including radius, diameter, area, circumference, center and chord
- I can identify π
- I can recognize the formulas for area and circumference of a circle
- I can determine the formulas for area and circumference of a circle, find its area
- I can find its circumference, given the area of a circle
- I can justify that π can be derived from the circumference and diameter of a circle
- I can apply the circumference or area formulas to solve mathematical and real-world problems
- I can justify the formulas for area and circumference of a circle and how they relate to π
- I can informally derive the relationship between circumference and area of a circle

Standard - CC.7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

- I can identify and recognize types of angles: supplementary, complementary, vertical, adjacent
- I can determine complements and supplements of a given angle
- I can determine unknown angle measures by writing and solving algebraic equations based on relationships between angles

Standard - CC.7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

- I can determine the formulas for area and volume and then procedure for finding surface area and when to use them in real-world and math problems for two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms

- I can solve real-world and math problems involving area, surface area and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms

Standard - CC.7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

- I can apply statistics terms such as population, sample, sample size, random sampling, generalizations, valid, biased and unbiased

- I can recognize sampling techniques such as convenience, random, systematic and voluntary

- I can recognize that generalizations about a population from a sample are valid only if the sample is representative of that population

- I can apply statistics to gain information about a population from a sample of the population

- I can generalize that random sampling tends to produce representative samples and support valid inferences

Standard - CC.7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.

- I can define random sample

- I can identify an appropriate sample size

- I can analyze and interpret data from a random sample to draw inferences about a population with an unknown characteristic of interest

- I can generate multiple samples (or simulated samples) of the same size to determine the variation in estimates or predictions by comparing and contrasting the samples

Standard - CC.7.SP.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.

- I can identify measures of central tendency (mean, median, and mode) in a data distribution
- I can identify measures of variation including upper quartile, lower quartile, upper extreme-maximum, lower extreme minimum, range, interquartile range, and mean absolute deviation (i.e. box-and-whisker plots, line plot, dot plots, etc.)
- I can compare two numerical data distributions on a graph by visually comparing data displays, and assessing the degree of visual overlap
- I can compare the differences in the measure of central tendency in two numerical data distributions by measuring the difference between the centers and expressing it as a multiple of a measure of variability

Standard - CC.7.SP.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.

- I can find measures of central tendency (mean, median, and mode) and measures of variability (range, quartile, etc.)
- I can analyze and interpret data using measures of central tendency and variability
- I can draw informal comparative inferences about two populations from random sample

Standard - CC.7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

- I can understand that probability is expressed as a number between 0 and 1
- I can understand that a random event with a probability of ½ is equally likely to happen
- I can understand that as probability moves closer to 1 it is increasingly likely to happen
- I can understand that as probability moves closer to 0 it is decreasingly likely to happen

- I can draw conclusions to determine that a greater likelihood occurs as the number of favorable outcomes approaches the total number of outcomes

Standard - CC.7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

- I can determine relative frequency (experimental probability) is the number of times an outcome occurs divided by the total number of times the experiment is completed

- I can determine the relationship between experimental and theoretical probabilities by using the law of large numbers

- I can predict the relative frequency (experimental probability) of an event based on the (theoretical) probability

Standard - CC.7.SP.7a 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. 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.

- I can use models to determine the probability of events

- I can recognize uniform (equally likely) probability

- I can develop a uniform probability model and use it to determine the probability of each outcome/event

Standard - CC.7.SP.7b 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. 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?

- I can use models to determine the probability of events

- I can develop a probability model (which may not be uniform) by observing frequencies in data generated from a change process

- I can analyze a probability model and justify why it is uniform or explain the discrepancy if it is not

Standard - CC.7.SP.8a Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

- I can determine that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs
- I can identify the outcomes in the sample space for an everyday event

Standard - CC.7.SP.8b Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

- I can define and describe a compound event
- I can find probabilities of compound events using organized lists, tree diagrams, etc. and analyze the outcomes
- I can choose the appropriate method such as organized lists, tables and tree diagrams to represent sample spaces for compound events

Standard - CC.7.SP.8c Find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

- I can define simulation
- I can design and use a simulation to generate frequencies for compound events