# MISSOURI MATHEMATICS CORE ACADEMIC STANDARDS CROSSWALK TO MISSOURI GLES/CLES
# CONTENT ALIGNMENTS AND SHIFTS – Grade 7 *DRAFT*

| **Grade 7** | |
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| **Critical Areas**<br>In Grade 7, instructional time should focus on four critical areas:<br>1. developing understanding of and applying proportional relationships;<br>2. developing understanding of operations with rational numbers and working with expressions and linear equations;<br>3. solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and<br>4. drawing inferences about populations based on samples. | **Mathematical Practices**<br>1. Make sense of problems and persevere in solving them.<br>2. Reason abstractly and quantitatively.<br>3. Construct viable arguments and critique the reasoning of others.<br>4. Model with mathematics.<br>5. Use appropriate tools strategically.<br>6. Attend to precision.<br>7. Look for and make use of structure.<br>8. Look for and express regularity in repeated reasoning. |

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| **Ratio and Proportional Relationships 7.RP** | | | |
| **Analyze proportional relationships and use them to solve real-world and mathematical problems.**<br>http://illustrativemathematics.org/illustrations/99<br>http://illustrativemathematics.org/illustrations/114<br>http://illustrativemathematics.org/illustrations/98 | | | |
| **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 $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour.*<br>http://illustrativemathematics.org/illustrations/470<br>http://illustrativemathematics.org/illustrations/82 | | **N1B8** ***use fractions***, decimals and percents ***to solve problems***<br><br>**N3E6** ***solve problems using ratios and rates***<br><br>**M2C6** ***solve problems involving the area*** or perimeter ***of polygons*** |

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| **7.RP.2** | Recognize and represent proportional relationships between quantities.<br>http://illustrativemathematics.org/illustrations/100<br>http://illustrativemathematics.org/illustrations/101<br>http://illustrativemathematics.org/illustrations/104<br>http://illustrativemathematics.org/illustrations/95<br>http://illustrativemathematics.org/illustrations/181<br>http://illustrativemathematics.org/illustrations/180 | | |
| **7.RP.2.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. | **N3E7** ***solve problems involving proportions***, such as scaling ***and finding equivalent ratios***<br><br>**A1D7** ***identify functions as linear or nonlinear from tables, graphs*** or equations | |
| **7.RP.2.b** | Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. | **N3E7** ***solve problems involving proportions***, such as scaling ***and finding equivalent ratios***<br>**A3A7** ***model and solve problems using multiple representations such as graphs, tables,*** expressions***, and linear equations*** | |
| **7.RP.2.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* | **A2A7** ***use symbolic algebra to represent unknown quantities in*** expressions or ***equations*** and solve linear equations with one variable | |
| **7.RP.2.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.** | | |

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| **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.*<br>http://illustrativemathematics.org/illustrations/148<br>http://illustrativemathematics.org/illustrations/130<br>http://illustrativemathematics.org/illustrations/121<br>http://illustrativemathematics.org/illustrations/117<br>http://illustrativemathematics.org/illustrations/102<br>http://illustrativemathematics.org/illustrations/105<br>http://illustrativemathematics.org/illustrations/106<br>http://illustrativemathematics.org/illustrations/266 | | **N3E7** ***solve problems involving proportions***, such as scaling and finding equivalent ratios | **N1B8 use** fractions, decimals and **percents to solve problems** |
| **The Number System 7.NS** | | | |
| **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** | | | |
| **7.NS.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.<br>http://illustrativemathematics.org/illustrations/314<br>http://illustrativemathematics.org/illustrations/310<br>http://illustrativemathematics.org/illustrations/46 | | |
| **7.NS.1.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*.** | | |

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| **7.NS.1.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. | **N1A7** compare and ***order*** all positive ***rational numbers and find their approximate locations on a number line*** | **N2C8** ***apply properties*** of operations ***to all rational numbers*** including order ***of*** operations and ***inverse operations*** |
| **7.NS.1.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. | **N1A7** compare and ***order*** all positive ***rational numbers and find their approximate locations on a number line***<br><br>**N2B7*** ***describe the effects of*** all ***operations on rational numbers including integers*** | |
| **7.NS.1.d** | Apply properties of operations as strategies to add and subtract rational numbers. | **N2C7** ****apply properties of operations (including order of operations) to positive rational numbers and integers***<br><br>**N3C7** ***apply*** all ***operations on rational numbers including integers*** | |
| **7.NS.2** | Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. | | |

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| **7.NS.2.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.** | **A2B7** ***use properties to generate equivalent forms for simple algebraic expressions that include positive rational and integers*** | |
| **7.NS.2.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 $-\left(\frac{p}{q}\right) = \frac{(-p)}{q} = \frac{p}{(-q)}$. **Interpret quotients of rational numbers by describing real-world contexts.** | **N2B7** ****describe the effects of*** all ***operations on rational numbers including integers*** | |
| **7.NS.2.c** | Apply properties of operations as strategies to multiply and divide rational numbers. | **N2C7** ****apply properties of operations (including order of operations) to positive rational numbers and integers***<br><br>**N3C7** ***apply*** all ***operations on rational numbers including integers*** | |
| **7.NS.2.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. | **N1B7** ***recognize and generate equivalent forms of fractions, decimals*** and percents | |

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| **7.NS.3** | **Solve real-world** and mathematical **problems involving the four operations with rational numbers.**<br>**(Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)**<br>http://illustrativemathematics.org/illustrations/298 | **N3C7** ***apply all operations on rational numbers including integers*** | **N1B8** ***use fractions, decimals*** and percents ***to solve problems*** |
| **Expressions and Equations 7.EE** | | | |
| **Use properties of operations to generate equivalent expressions.**<br>http://illustrativemathematics.org/illustrations/543<br>http://illustrativemathematics.org/illustrations/433 | | | |
| **7.EE.1** | Apply properties of operations as strategies to add, subtract, **factor,** and **expand linear expressions with rational coefficients.**<br>http://illustrativemathematics.org/illustrations/541 | | **A2B8** ***use properties to generate equivalent forms for simple algebraic expressions that include all rationals*** |
| **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."*** | **N1C7** ****recognize equivalent representations for the same number and generate them*** by decomposing and composing numbers including exponential notation | |
| **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.** | | | |

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| **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 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.*<br>http://illustrativemathematics.org/illustrations/478<br>http://illustrativemathematics.org/illustrations/108 | | **N1B7** ***recognize and generate equivalent forms of fractions, decimals and percents***<br><br>**N3D7** ****estimate and justify the results of all operations on rational numbers*** | **N1B8** ***use fractions, decimals and percents to solve problems***<br><br>**N2C8** ***apply properties of operations to all rational numbers including order of operations and inverse operations*** |
| **7.EE.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.<br>http://illustrativemathematics.org/illustrations/643 | | | |

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| **7.EE.4.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?* | **N3C7** ***apply all operations on rational numbers including integers***<br><br>**A2A7** ***use symbolic algebra to represent unknown quantities in expressions or equations and solve linear equations with one variable*** | |
| **7.EE.4.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.* | **N3C7** ***apply all operations on rational numbers including integers*** | **A2A8** ***use symbolic algebra to represent and solve problems that involve linear relationships*** |
| **Geometry 7.G** | | | |
| **Draw, construct, and describe geometrical figures and describe the relationships between them.** | | | |

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| **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. http://illustrativemathematics.org/illustrations/107 | **N3E7** ***solve problems involving proportions, such as scaling and finding equivalent ratios***<br><br>**G3B7** ***describe the relationships between the scale factor and the perimeter of the image using a dilation (contractions-magnifications; stretching/shrinking)***<br><br>**G4B7** ***draw or use visual models to represent and solve problems*** | **G3B8** ***describe the relationship between the scale factor and the area of the image using a dilation (stretching/shrinking)*** |
| **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.** | **G4B7** ***draw or use visual models to represent and solve problems*** | |
| **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 | **G1A7*** ***identify the 2-dimensional cross-section of a 3-dimensional shape*** | |
| **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.** | | | |
| **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.** http://illustrativemathematics.org/illustrations/34 | **M2C7** ***solve problems involving circumference and/or area of a circle*** and surface area/volume of a rectangular or triangular prism, or cylinder | |

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| **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. | **A2A7** ***use symbolic algebra to represent unknown quantities in*** expressions or ***equations and solve linear equations with one variable*** | **M2B8** ***solve problems of angle measure, including those involving triangles and parallel lines cut by a transversal*** |
| **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.<br>http://illustrativemathematics.org/illustrations/266 | **M1B7** ***identify the equivalent area and volume measures within a system of measurement (e.g. sq. ft. to sq. in., $m^2$ to $cm^2$)***<br><br>**M2C7** ***solve problems involving*** circumference and/or area of a circle and ***surface area/volume of a rectangular or triangular prism***, or cylinder | **M2C6** ***solve problems involving the area*** or perimeter ***of polygons*** |
| **Statistics and Probability 7.SP** | | | |
| **Use random sampling to draw inferences about a population.**<br>http://illustrativemathematics.org/illustrations/235<br>http://illustrativemathematics.org/illustrations/559<br>http://illustrativemathematics.org/illustrations/558<br>http://illustrativemathematics.org/illustrations/260 | | | |
| **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. | **D3A7** ***use observations about differences between samples to make conjectures about the populations from which the samples were taken*** | |

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| **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.* | **D2A7** ***find, use, and interpret measures of center and spread, including ranges***<br><br>**D3A7** ***use observations about differences between samples to make conjectures about the populations from which the samples were taken*** | **D1A6** formulate questions, design studies and ***collect data about a characteristic*** |
| **Draw informal comparative inferences about two populations.**<br>http://illustrativemathematics.org/illustrations/261 | | | |
| **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.* | **D2A7** ***find, use, and interpret measures of center and spread, including ranges*** | **D1A8** ***select, create and use appropriate graphical representation of data (including scatter plots)*** **and box plots (box and whiskers)** |

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| **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.* | **D2A7** ***find, use, and interpret measures of center and spread, including ranges***<br><br>**D3A7** ***use observations about differences between samples to make conjectures about the populations from which the samples were taken*** | |
| **Investigate chance processes and develop, use, and evaluate probability models.** | | | |
| **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 $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. | | **D4A5** ****describe the degree of likelihood of events using such words as certain, equally likely and impossible*** |
| **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.* | **D4A7** use models to ***compute the probability of an event and make conjectures*** (based on theoretical probability) ***about the results of experiments*** | |
| **7.SP.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. | | |

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| **7.SP.7.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.* | **D4A7** ***use models to compute the probability of an event*** and make conjectures (based on theoretical probability) about the results of experiments | |
| **7.SP.7.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?* | **D4A7** ***use models to compute the probability of an event*** and make conjectures (based on theoretical probability) about the results of experiments | |
| **7.SP.8** | Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.<br>http://illustrativemathematics.org/illustrations/343 | | |
| **7.SP.8.a** | **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.** | | |
| **7.SP.8.b** | 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. | | **D4A6** ***use a model (diagrams, list, sample space, or area model) to illustrate the possible outcomes of an event*** |

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|---|---|---|---|
| **7.SP.8.c** | **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?*** | | |
| **Grade 7 GLEs not included in Grade 7 CAS** | | | |
| **N2D7** *approximate the value of square roots to the nearest whole number<br>**A1B7** analyze patterns represented graphically or numerically with words of symbolic rules, including recursive notation<br>**A1C7** compare and contrast various forms of representations of patterns<br>**A4A7** compare situations with constant or varying rates of change<br>**G1B7** describe relationships between corresponding sides, corresponding angles, and corresponding perimeters of similar polygons<br>**G2A7** use coordinate geometry to construct and identify geometric shapes in the coordinate plane using their properties<br>**G3C7** *determine all lines of symmetry of a polygon<br>**G4A7** *use spatial visualization to identify various 2-dimensional views of isometric drawings<br>**M1A7** *identify and justify the unit of measure for volume (customary and metric)<br>**M1C7** solve problems involving addition and subtraction of time (hours, minutes, and seconds)<br>**M2B7** *use tools to measure angles to the nearest degree and classify the angle as acute, obtuse, right, straight, or reflex<br>**M2E7** convert from one unit to another within a system of measurement (capacity) and convert square or cubic units within the same system of measurement<br>**D1C7** select, create, and use appropriate graphical representation of data, including circle graphs, histograms | | | |