Mathematics Pacing Guide DRAFT Grade 7

Pacing Guides create a realistic time frame for instruction and assessment. They establish paced student learning expectations and provide a starting point for the implementation of the Common Core State Standards.

These are DRAFT guides for you to use for planning and instruction. Please keep track of pacing, "I can statements", what works, and what doesn't. During the school year, there will be multiple opportunities to get your feedback through steering committee meetings, electronic surveys, online threaded discussions, and feedback forms. **We want your feedback!**

The following tips may be helpful as you begin using the Pacing Guide:

- Introduce 9-week content skills according to the Pacing Guide, incorporating yearlong concepts.
- Once a skill is mastered, continue to practice it.
- Continue to reinforce skills and concepts throughout the year until mastery is achieved.
- Skills can be introduced earlier than listed, but no later, and can be assessed at any point after introduction.
- Compare your current pace to the Pacing Guide and adjust as needed.
- Become familiar with sequencing at previous and subsequent grade levels.
- The Common Core State Standards for your grade are provided at the back of this packet.
- The Pacing Guides and a link to Common Core resources that include vocabulary, examples, and suggested texts can be found on the Lansing School District homepage www.lansingschools.net under Links.

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7th GRADE (First Nine Weeks) Mathematics

	Cluster	Statement
The Number System (NS)	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.1a** ○ ***I can*** *describe situations that have opposite quantities combining to make zero.* **7.NS.1b** ○ ***I can*** *place a number and its opposite value on a horizontal and vertical number line.* ○ ***I can*** *demonstrate situations that have opposite quantities combining to make zero.* ○ ***I can*** *give an example of additive inverses.* ○ ***I can*** *add rational numbers in real-world situations.* **7.NS.1c** ○ ***I can*** *subtract rational numbers using additive inverses.* ○ ***I can*** *show that the distance between two points on a number line is the absolute value of their difference.* ○ ***I can*** *demonstrate using real-world examples that absolute value is always positive.* **7.NS.1d** ○ ***I can*** *explain and apply the associative property of addition using rational numbers.* ○ ***I can*** *explain and apply the commutative property of addition using rational numbers.* ○ ***I can*** *explain and apply the additive identity property using rational numbers.* ○ ***I can*** *explain and apply the additive inverse property using rational numbers.* **7.NS.2a** ○ ***I can*** *multiply rational numbers.* ○ ***I can*** *use the distributive property with rational numbers.* ○ ***I can*** *multiply signed numbers.* ○ ***I can*** *multiply rational numbers in real-world context.* **7.NS.2b** ○ ***I can*** *divide positive and negative rational numbers with non-zero divisors.* ○ ***I can*** *interpret quotients of rational numbers by describing real-world contexts.* ○ ***I can*** *explain that a negative fraction must have either a negative numerator or negative denominator.* **7.NS.2c** ○ ***I can*** *explain and apply the associative property of multiplication using rational numbers.* ○ ***I can*** *explain and apply the commutative property of multiplication using rational numbers.* ○ ***I can*** *explain and apply the multiplicative identity property using rational numbers. I can explain and apply the multiplicative inverse property using rational numbers.* **7.NS.2d** ○ ***I can*** *convert a rational number to a decimal (by hand) and explain that the decimal form of a rational number either terminates in zero or repeats.* ○ ***I can*** *recognize the difference between a repeating decimal and terminating decimal.* **7.NS.3** ○ ***I can*** *solve mathematical rational number problems.* ○ ***I can*** *solve real world rational number problems.* ○ ***I can*** *create mathematical rational number problems.* ○ ***I can*** *create real world rational number problems.*

	Cluster	Statement
Ratios & Proportional Relationships (RP)	Analyze proportional relationships and use them to solve real-world and mathematical problems.	NA

	Cluster	Statement
Expressions & Equations (EE)	Use properties of operations to generate equivalent expressions.	**7.EE.1** ○ ***I can*** *apply the distributive property to expand expressions.* ○ ***I can*** *identify and combine like terms utilizing commutative and associative properties for addition.* ○ ***I can*** *identify a common factor to find an equivalent expression.* **7.EE.2** ○ ***I can*** *rewrite an expression in an equivalent form in order to see how quantities are related.*
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	**7.EE.3** ○ ***I can*** *solve multi-step word problems with rational numbers.* ○ ***I can*** *convert between whole numbers, fractions and decimals if needed in solving a problem.* ○ ***I can*** *determine if my answers are reasonable using mental math and estimation.* ○ ***I can*** *apply properties of operation to solve problems using rational numbers.*

7th GRADE (First Nine Weeks) Mathematics

	Cluster	Statement
Geometry (G)	Draw, construct and describe geometrical figures and describe the relationship between them.	NA
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	NA

	Cluster	Statement	NOTES
Statistics & Probability (SP)	Use random sampling to draw inferences about a population.	NA	
	Draw informal comparative inferences about two populations.	NA	
	Investigate chance processes and develop, use, and evaluate probability models.	NA	

7th GRADE (Second Nine Weeks) Mathematics

The Number System (NS)

Cluster	Statement
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.3** ○ ***I can*** *solve mathematical rational number problems.* ○ ***I can*** *solve real world rational number problems.* ○ ***I can*** *create mathematical rational number problems.* ○ ***I can*** *create real world rational number problems.*

Ratios & Proportional Relationships (RP)

Cluster	Statement
Analyze proportional relationships and use them to solve real-world and mathematical problems.	**7.RP.1** ○ ***I can*** *find the unit rate given a ratio of fractions in a variety of real-world situations.* ○ ***I can*** *accurately identify unit rates.* **7.RP.2a** ○ ***I can*** *identify that two quantities are in a proportional relationship.* ○ ***I can*** *use a table to determine if two quantities are in a proportional relationship.* ○ ***I can*** *recognize that two quantities are proportional if their ordered pairs form a straight line through the origin.* **7.RP.2b** ○ ***I can*** *determine the constant of proportionality (rate of change) given a table.* ○ ***I can*** *determine the constant of proportionality (rate of change) given a graph.* ○ ***I can*** *determine the constant of proportionality (rate of change) given a diagram.* ○ ***I can*** *identify the constant of proportionality (rate of change) given an equation.* ○ ***I can*** *determine the constant of proportionality (rate of change) given a verbal description.* **7.RP.2c** ○ ***I can*** *translate a real world situation into an equation to demonstrate proportionality.* ○ ***I can*** *create a table to demonstrate proportionality.* **7.RP.2d** ○ ***I can*** *identify the unit rate as the y-coordinate when the x-coordinate is one (1) when given a graph* ○ ***I can*** *identify the unit rate as the y-coordinate when the x-coordinate is one (1) when given a table.* **7.RP.3** ○ ***I can*** *convert a percent into a proportional relationship out of 100.* ○ ***I can*** *convert a percent to a fraction or decimal when used in calculations.* ○ ***I can*** *convert between fractions, decimals and percents.* ○ ***I can*** *solve real-world multi-step ratio and percent problems.*

Expressions & Equations (EE)

Cluster	Statement
Use properties of operations to generate equivalent expressions.	NA
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	**7.EE.3** ○ ***I can*** *solve multi-step word problems with rational numbers.* ○ ***I can*** *convert between whole numbers, fractions and decimals if needed in solving a problem.* ○ ***I can*** *determine if my answers are reasonable using mental math and estimation.* ○ ***I can*** *apply properties of operation to solve problems using rational numbers.* **7.EE.4a** ○ ***I can*** *solve multi-step equations using rational numbers.* ○ ***I can*** *create multi-step equations from real-world situations using rational numbers.* ○ ***I can*** *use formulas and substitute information given to solve for the unknown.* ○ ***I can*** *compare an algebraic solution to an arithmetic solution.* ○ ***I can*** *identify the sequence of the operations used to solve the equation of a word problem.* **7.EE.4b** ○ ***I can*** *solve multi-step inequalities with the distributive property using rational numbers.* ○ ***I can*** *create multi-step inequalities using rational numbers.* ○ ***I can*** *graph the solution set of an inequality using rational numbers.* ○ ***I can*** *interpret the solution of the problem involving inequalities by using its graph.*

7th GRADE (Second Nine Weeks) Mathematics

	Cluster	Statement
Geometry (G)	Draw, construct and describe geometrical figures and describe the relationship between them.	NA
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	NA
Statistics & Probability (SP)	Use random sampling to draw inferences about a population.	NA
	Draw informal comparative inferences about two populations.	NA
	Investigate chance processes and develop, use, and evaluate probability models.	NA

NOTES

7th GRADE (Third Nine Weeks) Mathematics

The Number System (NS)		
Cluster	**Statement**	
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.3** ○ ***I can*** *solve mathematical rational number problems.* ○ ***I can*** *solve real world rational number problems.* ○ ***I can*** *create mathematical rational number problems.* ○ ***I can*** *create real world rational number problems.*	

Ratios & Proportional Relationships (RP)		
Cluster	**Statement**	
Analyze proportional relationships and use them to solve real-world and mathematical problems.	NA	

Expressions & Equations (EE)	
Cluster	**Statement**
Use properties of operations to generate equivalent expressions.	NA
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	**7.EE.3** ○ ***I can*** *solve multi-step word problems with rational numbers.* ○ ***I can*** *determine if my answers are reasonable using mental math and estimation.* ○ ***I can*** *apply properties of operation to solve problems using rational numbers.*

7th GRADE (Third Nine Weeks) Mathematics

Geometry (G)

Cluster	Statement
Draw, construct and describe geometrical figures and describe the relationship between them.	**7.G.1** ○ ***I can*** *use proportions to find unknown lengths of geometric figures.* ○ ***I can*** *use scale drawings to find areas of geometric figures.* ○ ***I can*** *reproduce a scale drawing at a different scale.* **7.G.2** ○ ***I can*** *draw a triangle (freehand, with a ruler and protractor, and technology).* ○ ***I can*** *identify the conditions that make a triangle unique.* ○ ***I can*** *determine the uniqueness of a triangle based on given angle and/or side measurements.* **7.G.3** ○ ***I can*** *identify the quadrilaterals that are made when a right rectangular prism is sliced.* ○ ***I can*** *identify the quadrilaterals that are made when a right rectangular pyramid is sliced.*
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	**7.G.4** ○ ***I can*** *identify the formulas for circumference and area of a circle.* ○ ***I can*** *find the area and circumference of a circle.* ○ ***I can*** *find the circumference of circle when given the area and vice versa.* ○ ***I can*** *show that π can be derived from the circumference and diameter of a circle.* **7.G.5** ○ ***I can*** *identify angles as supplementary, complementary, vertical, and adjacent pairs.* ○ ***I can*** *determine unknown angles' measures by using multi-step equations based on angle pairs.* ○ ***I can*** *write and solve an equation involving angle pair measures.* **7.G.6** ○ ***I can*** *substitute into formulas and solve for unknown quantities.* ○ ***I can*** *find the area of triangles, quadrilaterals, and other polygons.* ○ ***I can*** *find the volume of cubes and right prisms.* ○ ***I can*** *find the surface area of cubes and right prisms.*

Statistics & Probability (SP)

Cluster	Statement
Use random sampling to draw inferences about a population.	NA
Draw informal comparative inferences about two populations.	NA
Investigate chance processes and develop, use, and evaluate probability models.	NA

NOTES

7th GRADE (Fourth Nine Weeks) Mathematics

The Number System (NS)	Cluster	Statement	Ratios & Proportional Relationships (RP)	Cluster	Statement	Expressions & Equations (EE)	Cluster	Statement
	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.3** ○ ***I can*** *solve mathematical rational number problems.* ○ ***I can*** *solve real world rational number problems.* ○ ***I can*** *create mathematical rational number problems.* ○ ***I can*** *create real world rational number problems.*		Analyze proportional relationships and use them to solve real-world and mathematical problems.	NA		Use properties of operations to generate equivalent expressions.	NA
							Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	**7.EE.3** ○ ***I can*** *solve multi-step word problems with rational numbers.* ○ ***I can*** *determine if my answers are reasonable using mental math and estimation.* ○ ***I can*** *apply properties of operation to solve problems using rational numbers.*

7th GRADE (Fourth Nine Weeks) Mathematics

	Cluster	Statement
Geometry (G)	Draw, construct and describe geometrical figures and describe the relationship between them.	NA
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	NA

	Cluster	Statement	NOTES
Statistics & Probability (SP)	Use random sampling to draw inferences about a population.	**7.SP.1** ○ ***I can*** *define the following statistics vocabulary: population, sample, sample size, random sample, representative sample, simulated sample, inference, valid, biased, and unbiased.* ○ ***I can*** *use a sample to generalize a population.* ○ ***I can*** *use a random sampling to produce representative samples and support valid inferences.* **7.SP.2** ○ ***I can*** *choose an appropriate sample size of a population.* ○ ***I can*** *analyze and interpret data from a random sample to draw inferences about a population.* ○ ***I can*** *generate multiple samples (simulated samples).* ○ ***I can*** *use multiple samples (or simulated samples) of the same size to find variation in estimates or predictions.* ○ ***I can*** *compare actual data with my predictions/estimates from samples.*	
	Draw informal comparative inferences about two populations.	**7.SP.3** ○ ***I can*** *identify measures of central tendency (mean, median, and mode) in a data distribution.* ○ ***I can*** *identify measures of variation including range, upper quartile, lower quartile, interquartile range, outliers, and mean absolute deviation (average of the distances between data points and the mean).* ○ ***I can*** *compare two numerical data distributions on a plot.* ○ ***I can*** *compare the differences in the measure of central tendency in two numerical data distributions.* **7.SP.4** ○ ***I can*** *find measures of central tendency (mean, median, and mode) and measures of variability (range, quartile, etc.) of a random sample.* ○ ***I can*** *use measures of central tendency and variability to compare random samples of two populations.* ○ ***I can*** *make informal inferences (conclusions) comparing two populations from random samples.*	
	Investigate chance processes and develop, use, and evaluate probability models.	**7.SP.5** ○ ***I can*** *recognize that probability of an event is expressed as a rational number between 0 and 1.* ○ ***I can*** *recognize that an event with a probability of 1/2 is equally likely or unlikely to happen.* ○ ***I can*** *recognize that as the probability of an event moves closer to 1 in value it is more likely to happen.* ○ ***I can*** *recognize that as the probability of an event moves closer to 0 in value it is less likely to happen.* **7.SP.6** ○ ***I can*** *find the relative frequency (experimental probability) as the number of times an outcome occurs divided by the total number of times the experiment is completed.* ○ ***I can*** *find the theoretical probability of a chance event as the number of favorable outcomes divided by the total number of outcomes.* ○ ***I can*** *compare the relationship between experimental and theoretical probabilities of an event.* ○ ***I can*** *predict the relative frequency (experimental probability) of an event based on the theoretical probability.* **7.SP.7a** ○ ***I can*** *find uniform (equally likely) probability for an event.* ○ ***I can*** *create a uniform probability model.* ○ ***I can*** *use a uniform probability model to determine the probability of each outcome/event.* **7.SP.7b** ○ ***I can*** *use models to determine the probability of events.* ○ ***I can*** *create a probability model, which may or may not be uniform.* ○ ***I can*** *analyze a probability model and justify why it is uniform or not.* **7.SP.8a** ○ ***I can*** *define and describe a compound event.* ○ ***I can*** *recognize that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.* **7.SP.8b** ○ ***I can*** *find outcomes in the sample spaces for an event from an organized list, table, or tree diagram.* ○ ***I can*** *represent the outcomes of compound events using organized lists, tables, and tree diagrams.* **7.SP.8c** ○ ***I can*** *define simulation.* ○ ***I can*** *use a simulation for compound event to generate frequencies.* ○ ***I can*** *design a simulation to generate frequencies for compound events.*	

Mathematics | Grade 7

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (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 (4) drawing inferences about populations based on samples.

(1) Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

(2) Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

(3) Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

(4) Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

Grade 7 Overview

Ratios and Proportional Relationships

- **Analyze proportional relationships and use them to solve real-world and mathematical problems.**

The Number System

- **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**

Expressions and Equations

- **Use properties of operations to generate equivalent expressions.**
- **Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**

Geometry

- **Draw, construct and describe geometrical figures and describe the relationships between them.**
- **Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**

Statistics and Probability

- **Use random sampling to draw inferences about a population.**
- **Draw informal comparative inferences about two populations.**
- **Investigate chance processes and develop, use, and evaluate probability models.**

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ratios and Proportional Relationships 7.RP

Analyze proportional relationships and use them to solve real-world and mathematical problems.

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.*
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.
   b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
   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 $t = pn$.*
   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.
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.*

The Number System 7.NS

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

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.*
   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.
   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.
   d. Apply properties of operations as strategies to add and subtract rational numbers.
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.

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.

c. Apply properties of operations as strategies 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.

3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1]

Expressions and Equations 7.EE

Use properties of operations to generate equivalent expressions.

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

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."*

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

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 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.*

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?*

   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.*

Geometry 7.G

Draw, construct, and describe geometrical figures and describe the relationships between them.

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.

[1]Computations with rational numbers extend the rules for manipulating fractions to complex fractions.

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.
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.

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

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.
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.
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.

Statistics and Probability 7.SP

Use random sampling to draw inferences about a population.

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.
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.*

Draw informal comparative inferences about two populations.

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.*
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.*

Investigate chance processes and develop, use, and evaluate probability models.

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.

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.*

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.*

    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?*

8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

    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.

    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.

    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?*