Notes:

- #1-4 Interspersed throughout the course with explicit teaching of mathematical reasoning.
- #3-4 From Routines for Reasoning (teaching problem solving through math practices).
- #5-13 are content specific, are derived from district S&S and will be spiralled throughout the course.

Objectives

1. Collaboration (C) I can work well in a collaborative group.[1]	**2. Reasoning - Quantitative (Q)** I can reason quantitatively to solve problems.	**3. Reasoning - Structural(S)** I can reason structurally to solve problems.
4. Reasoning - Repetition (R) I can reason with repetition to solve problems.	**5. Algebra - Single Variable** I can write expressions and equations in one variable to solve problems.	**6. Algebra - Inequalities** I can write linear inequalities in one variable to solve problems.
7. Algebra - Two Variable I can write linear equations and inequalities in two variables to solve problems.	**8. Algebra - Linear Systems** I can solve systems of linear equations and inequalities in two variables to solve problems.	**9. Geometry - Coordinate** I can use coordinates and angle relationships to solve problems.
10. Geometry - Constructions I can construct geometric figures using a straightedge and compass.	**11. Geometry: Transformations & Congruence** I can transform figures in the plane and establish congruence in terms of rigid motion.	**12. Geometry - Triangle Congruence** I can justify the triangle congruence postulates and use them to establish congruence of figures and prove theorems.
13. Statistics I can summarize, represent, and interpret data on a single count or measurement variable.		

Big Course 1 Ideas		
Algebra	Geometry	Statistics
Write and solve equations in one variable to solve problems. Determine when relations are linear in nature and use linear models to solve problems. Determine when contexts provide	Apply the Pythagorean theorem to coordinate geometry to solve problems involving distance and midpoint. Explore geometric relationships and argumentation through parallel lines and angles.	Read and create data displays in one variable to describe, interpret, and compare data sets.

[1] I'm adding collaboration objective based on MP3 and Piaget's theory of social learning. Need to verify with department I can include it in assignment of course grade.

multiple linear constraints, write systems of linear equations, and find solutions.	Establish congruence in terms of rigid motion and construction. Understand argumentation as a logical sequence of deductive reasoning in context and application of triangle congruence.	

Find tasks for objectives 5-12. [Note: look for connections to multiple objectives in tasks, how can concepts build off each other?]

- Preferably 1 or 2 contexts for each objective that can be reinvestigated.

3-Act Math Resources			Inquiry Tasks and Other Task Resources		
101 questions	✔Kyle Pearce	✔Jon Orr	youcubed	IM	NRICH
✔Andrew Stadel	When Math Happens	Curriculum Maps	MAP	Achieve the Core	New Visions
✔Robert Kaplinsky	Mathalicious	Yummy math	Liliedahl Resources	Illuminations (Paid)	Serp media
newheartmath.com	Dan Meyer	Jon orr virtual cabinet	Ck 12 open source text	Jon Orr Desmos Big Ideas_Desmos Desmos (Teacher)	Underground Mathematics
Task Search	Task Search 2		✔John Rowe's Ebook	✔Math for love	Fawnnguyen.com

4th Step: Start spiraling.

- Consideration: District Benchmark Assessments
    - Fall Benchmark covers: [after ~9 weeks]
        - Solving Linear Equations
        - Solving Linear Inequalities
        - Arithmetic Sequences
    - Fall Semester Final covers above +:[after second 9 week block]
        - Linear Functions in two variables
        - Solving Systems
    - Spring Benchmark covers: [6 weeks into the semester (check to see if this is right)]
        - Basics of Geometry
        - Rigid Transformations
    - Spring Semester Final covers above +: [after last 12 weeks of school year]
        - Congruent Triangles
        - One Variable Statistics
- Plan around 3-4 day blocks for each topic.
    - Provide time for task and productive practice.
    - Provide time for Routines for Reasoning and collaboration
- Plan Mastery Days into schedule.

Objectives

1. I can work well in a collaborative group. **k = know; u = understand; d = do**

P^2=use in purposeful practice c^2 = common concept throughout T = investigate with task

1.k.1 Random groups aren't pre-selected by the teacher.
1.u.1 Working collaboratively with one another is important because we learn through social interaction.
1.d.1 I model the characteristics of humility. 1.d.1.a I share credit for ideas with others. 1.d.1.b I ask teammates for help when I need it. 1.d.1.c I celebrate the accomplishments of others. 1.d.2 I am a motivated member of the group. 1.d.2.a I contribute ideas to the group. 1.d.2.b I don't give up. 1.d.2.c I stay positive. 1.d.3 I am emotionally intelligent. 1.d.3.a I am kind and respectful to others. 1.d.3.b I think about how my words and actions might impact others before I speak or act. 1.d.3.c I make sure everyone's ideas and opinions are heard and valued.

2. Quantitative Reasoning [MP2]: I can reason quantitatively to solve problems.

2.k.1 A quantity has three parts: value, label, and sign. 2.k.2 Variables are used to represent an unknown value or values.
2.u.1 Mathematicians use quantities and relationships to solve problems. 2.u.2 Diagrams can illustrate relationships and help mathematicians solve problems.
2.d.1 I can identify the quantities in problems. 2.d.2 I can determine if a number represents a value of a quantity or a relationship between quantities. 2.d.3 I can represent the mathematical relationship between quantities with diagrams and appropriately label and annotate them. 2.d.4 I can identify unknown quantities and represent them with variables. 2.d.5 I can state how two quantities are mathematically related in different ways. 2.d.6 I can identify implied quantities and hidden relationships in problems. 2.d.7 I can represent mathematical quantities and relationships with expressions, equations and inequalities. 2.d.8 I can decontextualize (remove context/labels) and recontextualize (add context/labels) to solve problems.

3. Structural Reasoning [MP7]: I can reason structurally to solve problems.

3.k.1 Mathematical objects take a variety of forms: expressions, equations, functions, graphs, and geometric figures.
3.u.1 Mathematicians use the behavior of mathematical objects and their parts to understand and solve problems. 3.u.2 Mathematicians use known mathematical objects, relationships, and problems to understand and solve new problems. 3.u.3 A graph is a visual representation of the relationship between quantities.
3.d.1 I can use the methods or results of problems I've solved before to understand and solve new problems. 3.d.2 I can chunk and organize mathematical objects into recognizable pieces to uncover underlying similarity, structure, or behavior. 3.d.3 I can change the form of a representation—an expression or figure—to uncover underlying similarity, structure or behavior. 3.d.4 I can connect mathematical objects or chunks and their key features in various representations to help understand or solve problems. 3.d.5 I can use structure to create various representations of problems and use them to understand and solve problems.

4. Repetitive Reasoning [MP8]: I can reason with repetition and use repetition to solve problems.

4.k.1 A ***process*** is a repeated procedure (often in counting, calculating, or constructing).
4.u.1 Mathematicians notice repetition and patterns in a **process** of counting, calculating, or constructing and use repetition and patterns to understand and solve problems. 4.u.2 We observe repetition in a process to generalize our thinking.
4.d.1 I can describe repetition and growth from a variety of visual, numerical, and written sequences. 4.d.2 I can use patterns in a process of counting, calculating, or constructing to create shortcuts for counting, calculating, and constructing. 4.d.3 I can connect repetition in reasoning to an "input" value, such as n or x and use the variable to create a rule to make predictions and solve problems. 4.d.4 I can use repetition in a process of counting, calculating, or constructing to write expressions or equations that represent underlying mathematical relationships.

5. Algebra: I can write linear expressions and equations in one variable and use them to solve problems.

P² =use in purposeful practice c² = common concept throughout T = investigate with task

5.k.1 a_n is the nth term of a sequence a.

5.k.2 The order of operations (GEMA).

5.k.3 The absolute value of a number is its distance from zero and is represented by parallel bars. Example: |-5|=5

5.k.4 A linear expression or equation contains a single variable with no exponents or radicals.

5.u.1 Equations express relationships amongst quantities.

5.u.2 Solving equations is a process of reasoning and explaining that reasoning.

5.u.3 A solution or solution set to an equation is a value or set of values that makes the equation true.

5.d.1 I can represent patterns and sequences with equations and use them to solve problems.

- 5.d.1.a I can find the n^{th} term of a sequence.
- 5.d.1.b I can describe a general process for writing equations that represent arithmetic (linear) growth given visual, numerical, or written sequences.
- 5.d.1.c I can find n given a_n.

c² 5.d.2 I can create linear expressions and equations in one variable that describe quantities and their relationships.

c² P²5 .d.3 I can simplify expressions in one variable.

c² P²5.d.4 I can solve equations using inverse operations and the order of operations.

5.d.5 I can solve linear equations in one variable.

- 5.d.5.a I can solve linear equations in one variable using the distributive property.
- 5.d.5.b I can solve linear equations in one variable with multiple terms on a side.
- 5.d.5.c I can solve linear equations in one variable with variables on both sides.
- 5.d.5.d I can use the structure of an equation to help me solve the equation, for example, $\frac{2x+1}{3} = \frac{5}{3}$ means 2x+1=5.

p² 5.d.6 I can compare and critique multiple strategies for solving the same equation.

c² P²5.d.7 I can verify solutions to an equation and check that it makes sense.

5.d.8 I can write and solve an absolute value equation in one variable and graph the solution(s) on a number line.

p² 5.d.9 I can solve equations for which there is one solution, multiple solutions (absolute value), no solutions, and infinitely many solutions.

p² 5.d.10 I can determine the number of solutions (one, none, multiple, infinite) of an equation based on the structural features of the equation.

p² 5.d.11 I can solve formulas for a specified variable.

6. Algebra: I can write linear inequalities in one variable and use them to solve problems.

P^2=use in purposeful practice c^2= common concept throughout

Note: I may do all of this within P^2 of #5. Maybe as a way to extend contexts we've always used. For example: Filling it up (what are the amounts it could contain without overflowing?), or knot again! (for how many knots is the rope greater than?). Or taking word problems we've used and modifying them. Consider slow revealing these problems.

6.k.1 The inequality symbols: <, >, ≤,and ≥. 6.k.2 Compound inequalities contain more than one inequality, are described with the language and/or/between and may take different forms. x<5 and x>2 is equivalent to 2<x<5 (x is between 2 and 5).
6.u.1 The process for solving inequalities in one variable is similar to the process for solving equations with the exception of multiplying or dividing by negative numbers. 6.u.2 The value or values for which an inequality is made true is the solution to the inequality.
6.d.1 I can write inequalities in one variable and use them to solve problems. 6.d.2 I can solve inequalities in one variable. c^2 P^2 6.d.3 I can represent inequalities and their solutions on a number line. 6.d.4 I can solve absolute value inequalities and graph their solutions. 6.d.5 I can solve compound inequalities and graph their solutions. c^2 P^2 6.d.6 I can describe the solution sets of inequalities in words and symbolically. P^2 6.d.7 I can write a compound inequality to represent a graph. P^2 6.d.8 I can describe when and why an inequality might have no solutions, one solution, or infinite solutions.

7. Algebra: I can write linear equations and inequalities in two variables and use them to solve problems.

P^2=use in purposeful practice C^2 = common concept throughout

7.k.1 Linear relationships have a constant rate of change while non-linear relationships have variable rates of change.

7.k.2 Discrete data and variables only take integer values; continuous data and variables take on all values within a finite or infinite interval.

7.k.3 A coordinate pair is written in the form (x,y), where x is the horizontal coordinate and y is the vertical coordinate.

7.k.4 Slope is the steepness of the line and the constant rate of change of a linear relationship.

7.k.5 "Rise over run" refers to the constant rate of change or slope of a line.

7.u.1 A dependent variable relies on an independent variable in a two-variable equation.

7.u.2 A solution to an equation or inequality in two variables is a pair of values that simultaneously make the equation or inequality true.

7.u.3 Linear equations and inequalities in two variables may be written in a variety of common forms; the structures of these forms reveal different features of the linear relationship.

7.u.4 Linear relationships have a constant rate of change which is the ratio between two quantities; the constant rate of change appears in graphs (as slope), tables, contexts, and equations (linear coefficient).

$P^2$7.d.1 I can graph arithmetic sequences on a coordinate plane.

$P^2$7.d.2 I can graph linear equations and inequalities from point-slope form, slope-intercept form, and standard form.

$C^2P^2$7.d.3 I can determine if a relationship is linear from a variety of representations.

$C^2P^2$7.d.4 I can calculate the constant rate of change of a linear relationship from a variety of representations.

$C^2P^2$7.d.5 I can use the rate of change of a linear relationship to extend a sequence, table, or graph to solve problems.

$C^2P^2$7.d.6 I can identify the linear constant given a variety of representations.

7.d.7 I can write a linear equation or inequality in two variables in slope-intercept form, point-slope form, and standard form and use them to solve problems.

- 7.d.7.a Given a rate of change and y-intercept.
- 7.d.7.b Given a y-intercept and a point.
- 7.d.7.c Given two points.
  - 7.d.7.d.a I can find a formula for a sequence a_n, given two terms and where they are in the sequence.
- 7.d.7.e Given a graph, table, or context.

$C^2P^2$7.d.8 I can flexibly represent linear relationships with equations, graphs, tables, and contexts and convert between representations and forms of equations.

$C^2P^2$7.d.9 I can interpret linear equations and inequalities in two variables in terms of features and contexts.

- $C^2P^2$7.d.9.a I can identify the x and y intercepts of the graph of a linear equation or inequality and describe what they mean in context.

$P^2$7.d.10 I can provide both graphical and computational justification for why a given point is in the solution set of a linear inequality in two variables.

$P^2$7.d.11 I can explain what it means if, in a given context, the rates of change of multiple linear relationships are equivalent.

$P^2$7.d.12 I can identify whether the graphs of lines are parallel or perpendicular and what it means graphically and in context.

$P^2$7.d.13 I can write equations of parallel and perpendicular lines.

8. Algebra: I can solve systems of linear equations and inequalities in two variables.

P^2=use in purposeful practice C^2 = common concept throughout C^2P^2 = maybe both

8.k.1 A system of equations is a set of two or more equations that share variables.
8.u.1 The solution to a linear system of equations in two variables is the coordinate pair(s) that make all equations in the system true; the solution to a linear system is also the point(s) of intersection of the graphs of the equations in the system. 8.u.2 The solution to a linear system of inequalities in two variables is the set of coordinate pairs that make each inequality in the system true; since the coordinate pairs don't have to lie on the boundaries of the inequality, the solution will be graphed by shading a region in a plane.
$C^2P^2$8.d.1 I can describe what the solution of a linear system of equations means in context. 8.d.2 I can solve systems of linear equations by graphing. 8.d.3 I can solve systems of linear equations with substitution. 8.d.4 I can solve systems of linear equations with the elimination method. $P^2$8.d.5 I can determine if a system of linear equations has one, none, or infinitely many solutions graphically and algebraically. C^2 8.d.6 I can graph the solution of a system of linear equations. $P^2$8.d.7 I can create a system of inequalities in two variables to define a region containing specific coordinates.

9. Geometry: I can use coordinates and angle relationships to solve problems.

9.k.1 The pythagorean theorem: In a right triangle, the sum of the squares of the legs is equal to the square of the hypotenuse. 9.k.1 The distance formula.
9.u.1 The distance formula is an application of the Pythagorean relationship of right triangles.
9.d.1 I can use the Pythagorean theorem to solve problems. $P^2$9.d.2 I can calculate the distance between two points given their coordinates and without measuring. 9.d.3 I can determine the coordinates of the midpoint between two points given their coordinates. 9.d.4 I can use angle relationships to label missing angles on a diagram. 9.d.4.a I can use corresponding angles, vertical angles, complementary angles, supplementary angles, alternate interior angles, and the triangle angle sum theorem to determine unknown angles. $P^2$9.d.4.b I can prove angle relationships within triangles.

10. Geometry: I can construct geometric figures using a straightedge and compass.

P^2=use in purposeful practice C^2 = common concept throughout C^2P^2 = maybe both

Note: Intersperse while spiraling, just spend a day at a time(create format for constructing and explaining steps)

10.k.1 A compass is a drawing image used to draw circles and arcs. 10.k.2 A straight edge is a tool for drawing straight lines. 10.k.3 To bisect means to cut in half. 10.k.4 Perpendicular means to meet at right (90 degree) angles.
10.u.1 Constructions must be exact—they are not approximations and do not involve measurement.
10.d.1 I can construct a copy of a segment. 10.d.2 I can construct a copy of an angle. 10.d.3 I can construct a segment bisector. 10.d.4 I can construct an angle bisector. 10.d.5 I can construct a parallel line to a given line through a point not on the line. 10.d.6 I can construct a perpendicular line to a given line through a point not on the line. 10.d.7 I can construct a triangle using a straightedge and compass. 10.d.8 I can construct a variety of figures using a straightedge and compass. Resource: Link 1

11. Geometry: I can transform figures in a plane and establish congruence in terms of rigid motion.

11.k.1 When a figure, for example Figure A, is transformed in some way, Figure A is called the **pre-image** and the resulting figure, A' (said A-prime), is the **image**. 11k.2 **Congruent** figures (including segments and angles) have equal measure. 11.k.3 A **rigid motion** (isometry) preserves (does not change) length and angle measures. Translations, reflections, and rotations are rigid motions.
11.u.1 If either of two figures may be moved onto the other through any combination of rigid transformations: a translation, reflection, or rotation, then the figures are congruent.
11.d.1 I can translate, reflect, and rotate[2] images in the plane and write the coordinate representations. 11.d.2 I can describe a series of transformations needed to move a pre-image to an image. $P^2$11.d.3 I can compare and contrast the properties of translations, reflections, and rotations and the effects they have on images. $C^2P^2$11.d.4 I can label corresponding parts of a preimage and image with proper notation. $C^2P^2$11.d.5 I can identify corresponding parts of triangles and use notation to describe them. 11.d.6 I can determine if two figures are congruent by mapping a preimage onto an image through a combination of rigid transformations.

[2] Translations, reflections, and rotations may be taught separately while spiralling. Written on one line to save space.

12. Geometry: I can justify the triangle congruence postulates and use them to establish congruence and prove theorems.

P^2=use in purposeful practice C^2 = common concept throughout C^2P^2 = maybe both

Note: Might want to spend 1-2 days at a time, not 3-4.

12.k.1 A postulate is generally accepted to be a true. 12.k.2 A theorem is proven to be true using postulates and other theorems.
12.u.1 Triangle congruence postulates and theorems (ASA, SAS, SSS, AAS, and HL) work because if the provided sides/angles of triangles are congruent, it is inevitable that the other sides and angles are congruent. 12.u.2 A proof is an inferential argument for a mathematical statement.
12.d.1 I can justify the triangle congruence postulates using constructions. 12.d.2 I can use triangle congruence postulates to prove two triangles are congruent. 12.d.3 I can use triangle congruence postulates to prove two polygons are congruent. 12.d.4 I can use triangle congruence postulates and theorems to prove other theorems. (see parallelogram proofs for example) 12.d.5 I can use CPCTC to prove that corresponding parts (angles and sides) of triangles are congruent. 12.d.5.a I can use CPCTC to prove that corresponding parts of polygons are congruent. C^2 12.d.6 I can organize, connect, and communicate the reasoning of a logical argument.

13. Statistics: I can summarize, represent, and interpret data on a single count or measurement variable.

P^2=use in purposeful practice C^2 = common concept throughout C^2P^2 = maybe both

Note: Find problems to generate data or provide data. Use to introduce various types of graphs and describe their distributions. Key concepts: when are various measures of central tendency appropriate and when might I use a particular method to describe distribution mathematically?

13.k.1 The mean is the average of the data set.

13.k.2 The mode is the number which appears most often in a data set.

13.k.3 The median is the middle number of a data set organized in order from least to greatest or greatest to least.

13.k.4 Know the features comprising stem-and-leaf plots, box-and-whisker plots, and histograms.

13.k.5 How to calculate mean average deviation and the interquartile range.

13.u.1 The measures of central tendency provide different information about univariate data sets and that different information is communicated by each.

13.u.2 Dispersion (spread) describes how a data set is distributed (the way in which it is stretched or squeezed).

13.d.1 I can use stem-and-leaf plots to represent and compare data sets.

13.d.2 I can use box-and-whisker plots to represent and compare data sets.

13.d.3 I can use histograms to represent and compare data sets.

13.d.4 I can calculate the measures of central tendency: mean, median and mode.

P^2 (during T?) 13.d.5 I can compare different measures of center and determine the appropriateness of the measures of central tendency.

13.d.6 I can describe the distribution of data sets.

13.d.7 I can measure and interpret measures of variation:

- 13.d.7.a Mean average deviation.
- 13.d.7.b Interquartile Range
- 13.d.7.c I can analyze the relationship between range, variation, and the mean using standard deviation.

$P^2$13.d.8 I can identify the effects of transformations on data and their measures of central tendency and variation.

$C^2P^2$13.d.9 I can choose and create appropriate data displays.

$P^2$13.d.10 I can analyze misleading graphs.