EdGems COURSE 3

EdGems Math ~ Course 3 Content Standards Alignment

Cluster Overview

Key: Major Clusters; Supporting Clusters; Additional Clusters

The Number System

- **8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.**

Expressions and Equations

- **8.EE.A Work with radicals and integer exponents**
- **8.EE.B Understand the connections between proportional relationships, lines and linear equations.**
- **8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.**

Functions

- **8.F.A Define, evaluate and compare functions.**
- **8.F.B Use functions to model relationships between quantities.**

Geometry

- **8.G.A Understand congruence and similarity using physical models, transparencies or geometry software.**
- **8.G.B Understand and apply the Pythagorean Theorem.**
- **8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.**

Statistics and Probability

- **8.SP.A Investigate patterns of association in bivariate data.**

8.NS ~ The Number System

8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.

Lessons 1.4, 1.5, 5.6

8.NS.A.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

Lesson 1.4, 1.5

8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

8.EE ~ Expressions and Equations

8.EE.A Work with radicals and integer exponents.

Lessons 8.1, 8.2

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.

Lessons 1.4, 1.6

8.EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Lessons 8.3, 8.4

8..EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*

Lesson 8.4

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

8.EE.B Understand the connections between proportional relationships, lines and linear equations.

Lessons 3.2, 3.3, 3.4

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

Lessons 3.3, 3.4, 4.3, 6.4

8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

8.EE.C.7 Solve linear equations in one variable.

Lesson 1.3

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Lessons 1.1, 1.2, 1.3

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.

Lessons 5.1, 5.2, 5.3, 5.4, 5.5

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

Lessons 5.2, 5.3, 5.4, 5.5

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*

Lessons 5.2, 5.3, 5.4, 5.5

c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

8.F ~ Functions

8.F.A Define, evaluate and compare functions.

Lesson 3.1

8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

Lessons 3.2, 4.3

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

Lessons 4.1, 4.2, 4.3, 4.4, 4.5

8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1), (2, 4) and (3, 9), which are not on a straight line.*

8.F.B Use functions to model relationships between quantities.

Lessons 4.1, 4.2, 4.3, 4.5

8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Lessons 4.1, 4.2, 4.3, 4.5, 4.6

8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

8.G ~ Geometry

8.G.A Understand congruence and similarity using physical models, transparencies or geometry software.

Lessons 7.1, 7.2, 7.3, 7.4	**8.G.A.1**	Verify experimentally the properties of rotations, reflections, and translations: **a.** Lines are taken to lines, and line segments to line segments of the same length. **b.** Angles are taken to angles of the same measure. **c.** Parallel lines are taken to parallel lines.
Lessons 7.1, 7.2, 7.3, 7.4, 7.5	**8.G.A.2**	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
Lessons 7.1, 7.2, 7.3, 7.4	**8.G.A.3**	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.
Lessons 7.4, 7.5	**8.G.A.4**	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
Lessons 6.1, 6.2, 6.3, 6.4, 6.5	**8.G.A.5**	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
Lesson 2.1	**8.G.B.6**	Explain a proof of the Pythagorean Theorem and its converse.
Lessons 2.1, 2.2	**8.G.B.7**	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Lesson 2.3	**8.G.B.8**	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

8.G Solve real-world mathematical problems involving volume of cylinders, cones and spheres.

Lessons 9.1, 9.2, 9.3	**8.G.9**	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

8.SP ~ Statistics and Probability

8.SP.A Investigate patterns of association in bivariate data.

Lesson 10.1, 10.2, 10.3

8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

Lessons 10.2, 10.3

8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Lessons 10.2, 10.3

8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

Lesson 10.4

4.SP.A.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

Focus and Connecting Standards Alignment

EdGems Math supports students' proficiency in the Common Core State Standards through a program-design which supports the interconnectivity of mathematical ideas while providing clear learning objectives. This is achieved by designating Focus Standards in each lesson and Connecting Standards in each unit. The qualifiers of Focus and Connecting Standards were developed by the EdGems Math authoring team to design a scope and sequence in which mathematical ideas build upon each other and are revisited throughout the course. Each EdGems Math lesson identifies one or more standards as a Focus Standard to provide a focal point for the lesson objectives. The unit then provides opportunities for further connections to other standards across clusters and domains. These Connecting Standards offer opportunities for students to draw up and apply many mathematical ideas throughout the unit. The following chart shows when each standard is aligned as a Focus Standard or Connecting Standard throughout the course. Further explanations of the Focus and Connecting Standards are available within each Unit Overview.

	Focus Standard Lesson(s)	Connecting Standard Unit(s)
8.NS.A.1	Lessons 1.4-1.5, 5.6	Units 2, 9
8.NS.A.2	Lessons 1.4-1.5	Units 2, 9
8.EE.A.1	Lessons 8.1-8.2	Units 1, 9
8.EE.A.2	Lessons 1.4, 1.6	Units 2, 8, 9
8.EE.A.3	Lesson 8.3	
8.EE.A.4	Lessons 8.3-8.4	
8.EE.B.5	Lessons 3.2-3.4	Units 4, 5, 6, 7, 8
8.EE.B.6	Lessons 3.3-3.4, 4.3, 6.4	Unit 10
8.EE.C.7	Lessons 1.1-1.3	Units 2, 3, 4, 5, 6, 10
8.EE.C.8	Lessons 5.1-5.5	Unit 1
8.F.A.1	Lesson 3.1	Units 4, 5
8.F.A.2	Lessons 3.2, 4.3	Units 5, 8, 10
8.F.A.3	Lessons 4.1-4.5	Units 5, 10
8.F.B.4	Lessons 4.1-4.3, 4.5	Units 5, 9, 10

	Focus Standard Lesson(s)	Connecting Standard Unit(s)
8.F.B.5	Lessons 4.1-4.3, 4.5-4.6	Units 5, 10
8.G.A.1	Lessons 7.1-7.4	
8.G.A.2	Lessons 7.1-7.5	
8.G.A.3	Lessons 7.1-7.4	
8.G.A.4	Lessons 7.4-7.5	Unit 2
8.G.A.5	Lessons 6.1-6.5	Units 2, 7
8.G.B.6	Lesson 2.1	
8.G.B.7	Lessons 2.1-2.2	Units 3, 6
8.G.B.8	Lesson 2.3	Unit 6
8.G.C.9	Lessons 9.1-9.3	Units 1, 8
8.SP.A.1	Lessons 10.1-10.3	Unit 4
8.SP.A.2	Lessons 10.2-10.3	Unit 4
8.SP.A.3	Lessons 10.2-10.3	Unit 4
8.SP.A.4	Lesson 10.4	

Focus Standards Alignment by Lesson

Unit	Lesson	Focus Content Standard(s)	Focus SMP
Equations	1.1	8.EE.C.7b	SMP5
	1.2	8.EE.C.7b	SMP2
	1.3	8.EE.C.7	SMP1
	1.4	8.NS.A.1/8.NS.A.2/ 8.EE.A.2	SMP6
	1.5	8.NS.A.1/8.NS.A.2	SMP3
	1.6	8.EE.A.2	SMP7
The Pythagorean Theorem	2.1	8.G.B.6/8.G.B.7	SMP7
	2.2	8.G.B.7	SMP4
	2.3	8.G.B.8	SMP6
Proportional Relationships and Slope	3.1	8.F.A.1	SMP3
	3.2	8.EE.B.5/8.F.A.2	SMP4
	3.3	8.EE.B.5/8.EE.B.6	SMP6
	3.4	8.EE.B.5/8.EE.B.6	SMP7
Functions	4.1	8.F.A.3/8.F.B.4-5	SMP5
	4.2	8.F.A.3/8.F.B.4-5	SMP2
	4.3	8.F.A.2-3/8.F.B.4-5/ 8.EE.B.6	SMP7
	4.4	8.F.A.3	SMP3
	4.5	8.F.A.3/8.F.B.4-5	SMP3
	4.6	8.F.B.5	SMP1
Systems of Equations	5.1	8.EE.C.8a	SMP2
	5.2	8.EE.C.8a-c	SMP5
	5.3	8.EE.C.8a-c	SMP6
	5.4	8.EE.C.8a-c	SMP7
	5.5	8.EE.C.8a-c	SMP4
	5.6	8.NS.A.1	SMP8

Unit	Lesson	Focus Content Standard(s)	Focus SMP
Angle Relationships	6.1	8.G.A.5	SMP5
	6.2	8.G.A.5	SMP6
	6.3	8.G.A.5	SMP3
	6.4	8.G.A.5/8.EE.B.6	SMP7
	6.5	8.G.A.5	SMP1
Transformations	7.1	8.G.A.1/8.G.A.2/ 8.G.A.3	SMP8
	7.2	8.G.A.1/8.G.A.2/ 8.G.A.3	SMP2
	7.3	8.G.A.1/8.G.A.2/ 8.G.A.3	SMP7
	7.4	8.G.A.1/8.G.A.2/ 8.G.A.3/8.G.A.4	SMP3
	7.5	8.G.A.2/8.G.A.4	SMP1
Exponent Properties	8.1	8.EE.A.1	SMP8
	8.2	8.EE.A.1	SMP8
	8.3	8.EE.A.3	SMP6
	8.4	8.EE.A.3/8.EE.A.4	SMP1
Volume	9.1	8.G.C.9	SMP2
	9.2	8.G.C.9	SMP1
	9.3	8.G.C.9	SMP7
Bivariate Data	10.1	8.SP.A.1	SMP3
	10.2	8.SP.A.1/8.SP.A.2/ 8.SP.A.3	SMP2
	10.3	8.SP.A.1/8.SP.A.2/ 8.SP.A.3	SMP5
	10.4	8.SP.A.4	SMP4

Major Standard Supporting Standard Additional Standard Pre-Requisite

Standards for Mathematical Practice Alignment

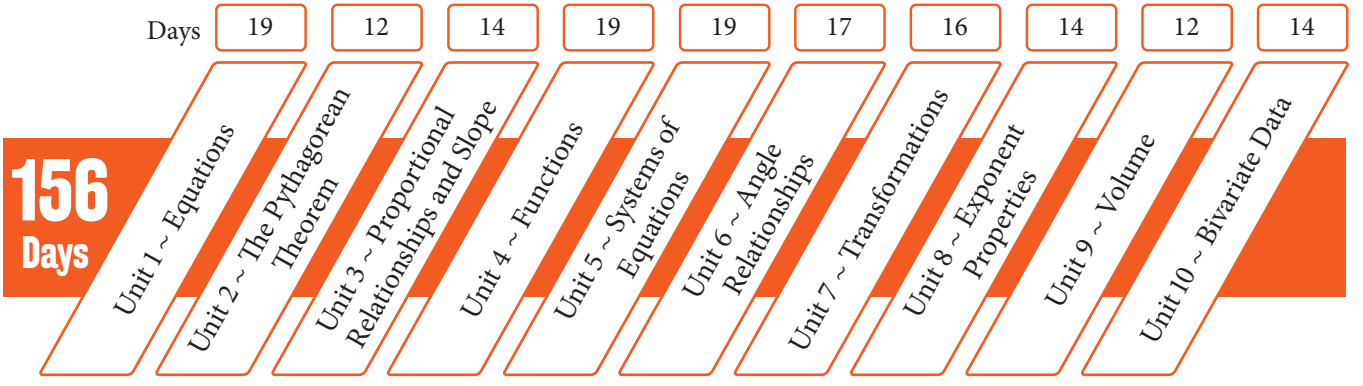
The Standards for Mathematical Practice (SMPs) are integrated throughout the entirety of the EdGems Math curriculum. While every lesson provides specific implementation guidance for the SMPs in the Teacher Guide, each lesson also has a Focus Math Practice Standard. The correlation between these Focus Math Practices and student lessons is shown in the table below. There are also opportunities for each SMP to be formatively assessed during the listed unit's Storyboards and Performance Task. Additionally, there are opportunities for each SMP to be summatively assessed during the Performance Assessment in the listed unit or units.

SMP	Student Lessons	Storyboards	Performance Tasks	Performance Assessments
SMP1 *Make sense of problems and persevere in solving them.*	1.3, 4.6, 6.5, 7.5, 8.4, 9.2	Units 1, 9	Unit 8	Unit 7
SMP2 *Reason abstractly and quantitatively.*	1.2, 4.2, 5.1, 7.2, 9.1, 10.2	Unit 8	Unit 1	Unit 9
SMP3 *Construct viable arguments and critique the reasoning of others.*	1.5, 3.1, 4.4, 4.5, 6.3, 7.4, 10.1	Unit 4	Units 2, 7	Unit 5
SMP4 *Model with mathematics.*	2.2, 3.2, 5.5, 10.4	Units 2, 3	Unit 9	Unit 4
SMP5 *Use appropriate tools strategically.*	1.1, 4.1, 5.2, 6.1, 10.3	Unit 10	Unit 10	Unit 2
SMP6 *Attend to precision.*	1.4, 2.3, 3.3, 5.3, 6.2, 8.3, 9.3	Unit 5	Unit 6	Units 3, 8
SMP7 *Look for and make use of structure.*	1.6, 2.1, 3.4, 4.3, 5.4, 6.4, 7.3	Unit 6	Unit 5	Units 1, 10
SMP8 *Look for and express regularity in repeated reasoning.*	5.6, 7.1, 8.1, 8.2	Unit 7	Units 3, 4	Unit 6

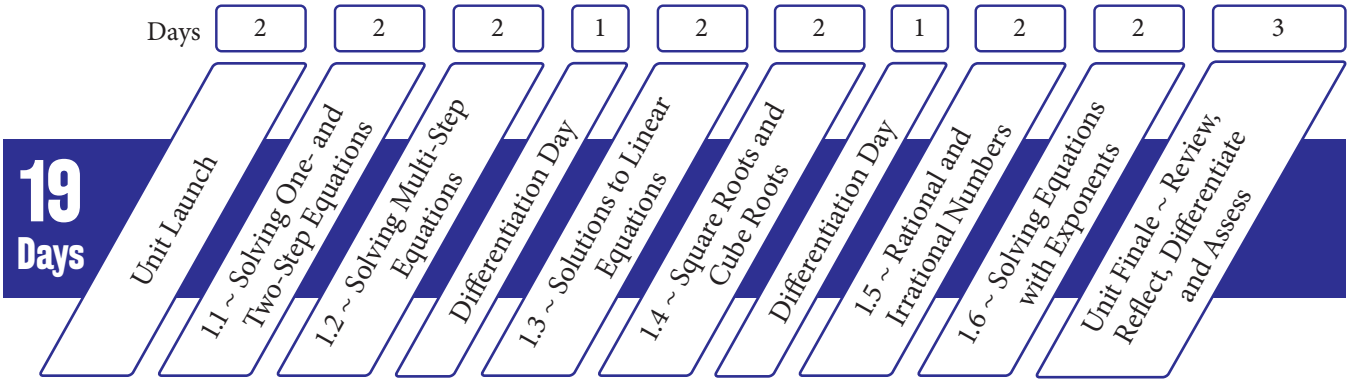
EdGems Math ~ Course 3 Pacing Guide

This Course 1 Pacing Guide is based on daily 45-60 minute math class periods. Each unit includes days for the Unit Launch, lessons, Differentiation Days and Unit Finale (which includes assessment). Any additional days beyond the 156 days allow for flexibility in the pacing calendar to include such things as (1) beginning of the year activities, (2) state assessment preparation and (3) benchmark/state assessments.

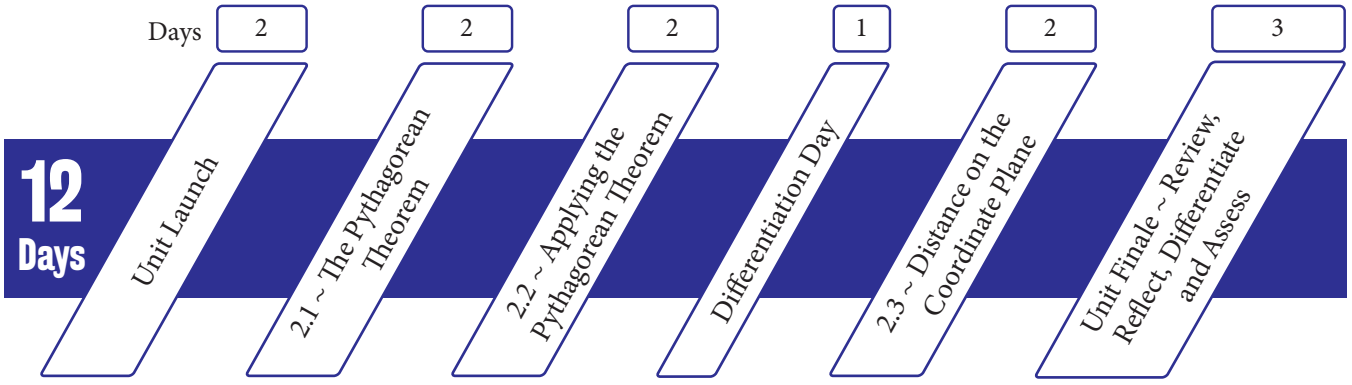
Year at a Glance



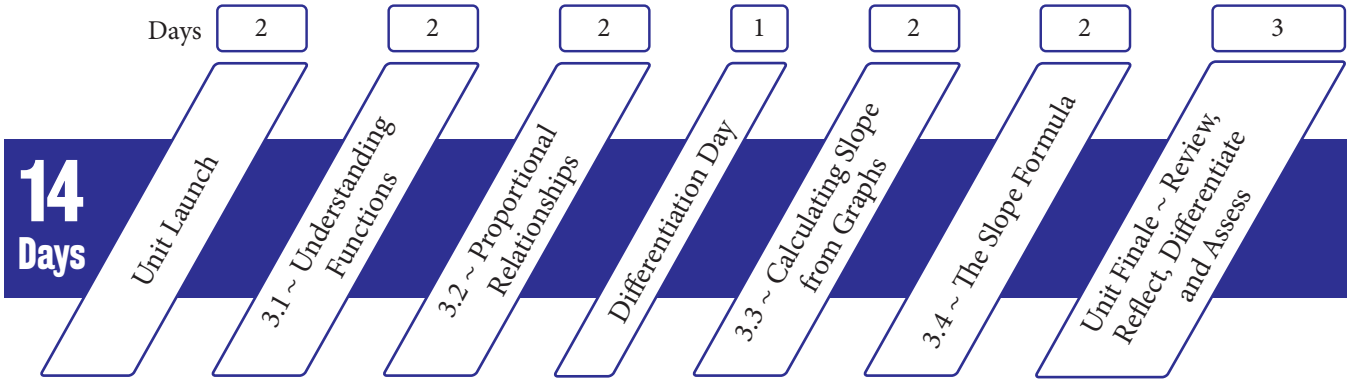
Unit 1 ~ Equations



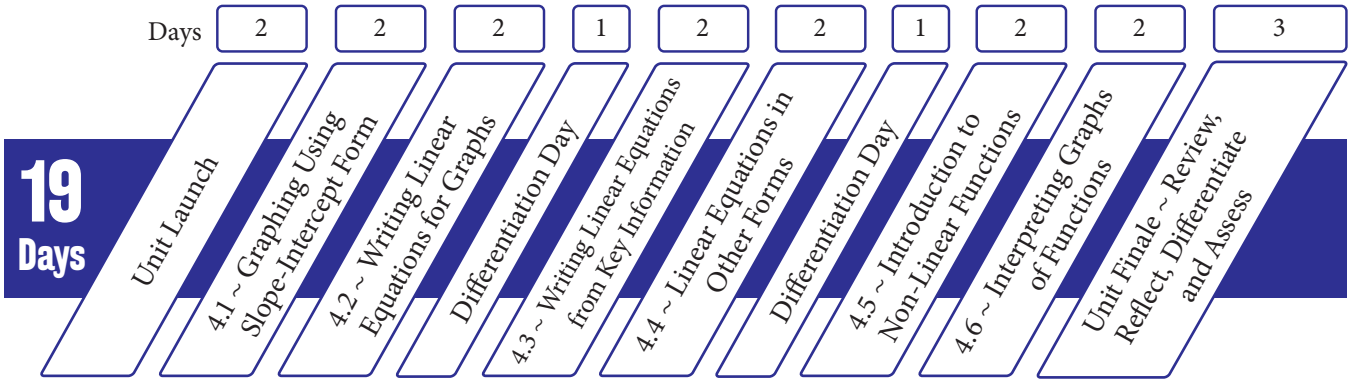
Unit 2 ~ The Pythagorean Theorem



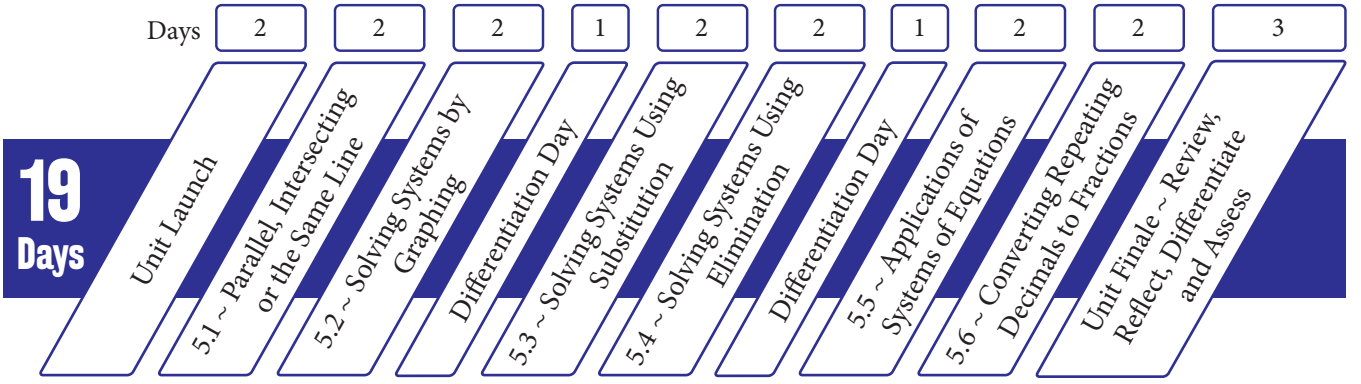
Unit 3 ~ Proportional Relationships and Slope



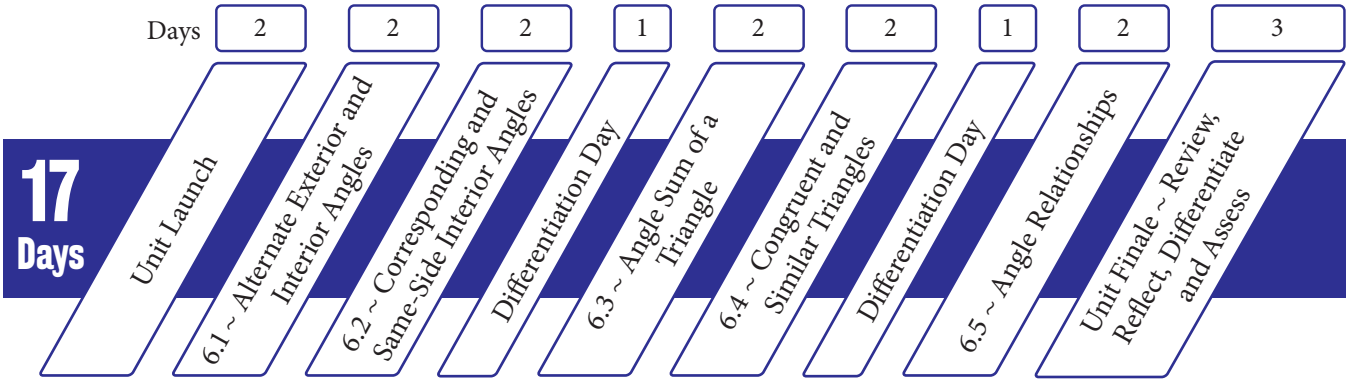
Unit 4 ~ Functions



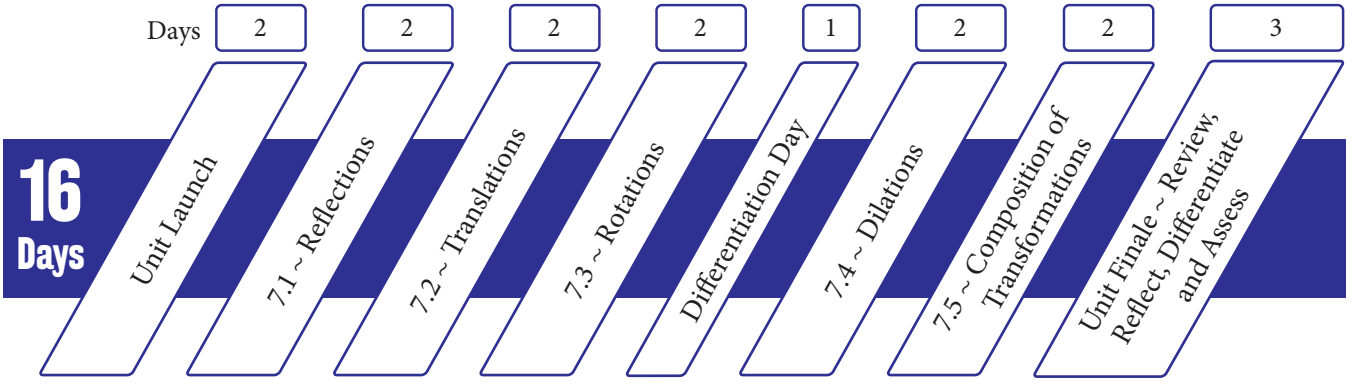
Unit 5 ~ Systems of Equations



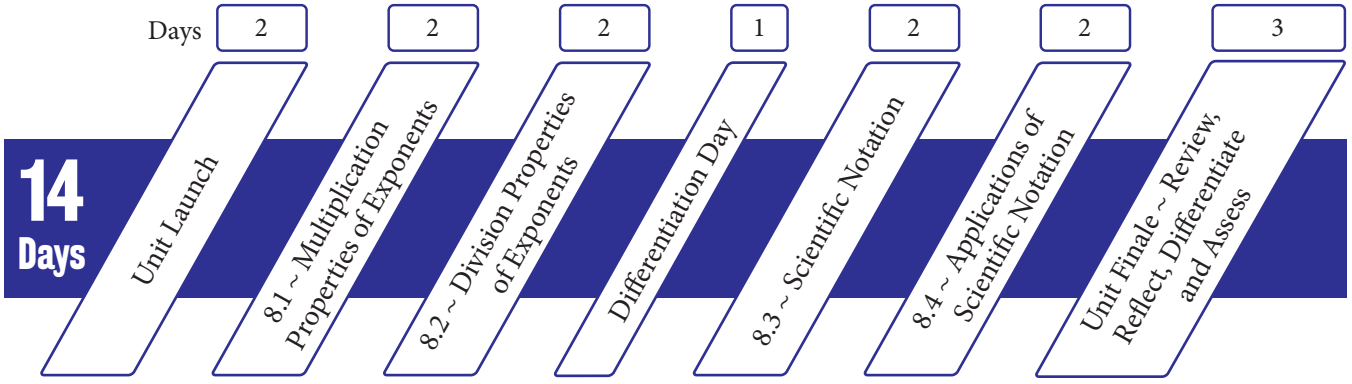
Unit 6 ~ Angle Relationships



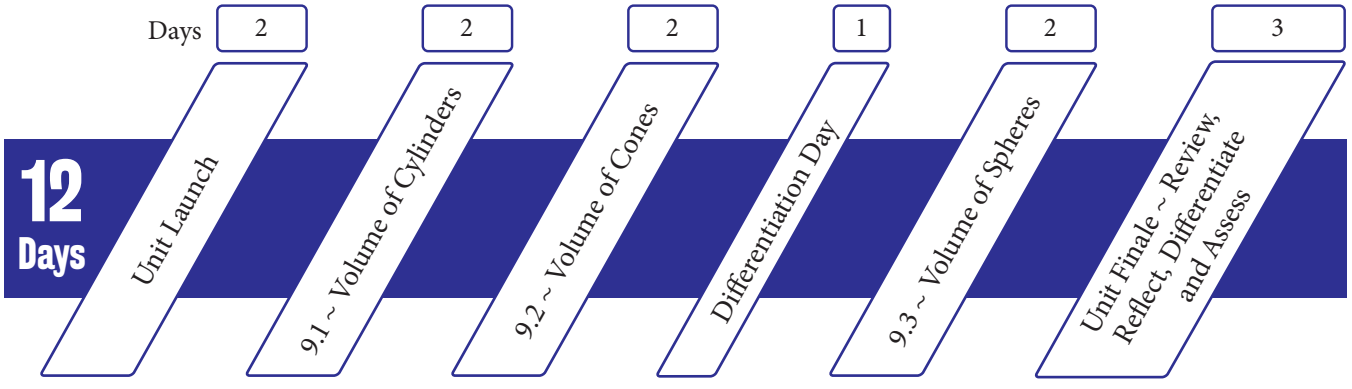
Unit 7 ~ Transformations



Unit 8 ~ Exponent Properties



Unit 9 ~ Volume



Unit 10 ~ Bivariate Data