MATH 8

Course Overview Documents

A Program of the A+ Education Partnership
In partnership with the Alabama State Dept. of Education

MATH 8

Course Overview

1ST 9-WEEKS

Unit 1: Pythagorean Theorem & the Number System

Unit 2: Transformations

Unit 3: Solving Equations Conceptually

2ND 9-WEEKS

Unit 4: Functions

Unit 5: Analyzing & Interpreting Functions

3RD 9-WEEKS

Unit 6: Solving Multi-Step Equations

Unit 7: Systems of Equations

Unit 8: Statistics

4TH 9-WEEKS

Unit 9: Angle Relationships

Unit 10: Volume

Unit 11: Exponents & Scientific Notation

STANDARDS CHECKLIST				
ALCOS	**1ST 9-WEEKS**	**2ND 9-WEEKS**	**3RD 9-WEEKS**	**4TH 9-WEEKS**
1	X			
2	X			
3				X
4	X			
5				X
6				X
7	X	X		
8		X		
9		X		
10		X		
11			X	
12			X	
13		X		
14		X		
15		X		
16		X	X	X
17		X		
18			X	
19			X	
20			X	
21			X	
22	X			
23	X			
24	X			

STANDARDS CHECKLIST				
ALCOS	**1ST 9-WEEKS**	**2ND 9-WEEKS**	**3RD 9-WEEKS**	**4TH 9-WEEKS**
25				X
26	X			
27	X			
28	X			
29				X
30				X

MATH 8

Scope and Sequence – 1st 9 Weeks

Unit 1: Pythagorean Theorem & the Number System	Unit 2: Transformations	Unit 3: Solving Equations Conceptually

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
WEEK 1	Lonesome Llama & Group Norms	Classroom Procedures	[1] Perfect Squares and Perfect Cubes	[2] Solving Quadratic and Cubic Equations by Inspection	[3] Approximating Square Roots
WEEK 2	[3] Approximating Square Roots	[4] Discovering the Pythagorean Theorem	[4] Discovering the Pythagorean Theorem	[5] Practicing the Pythagorean Theorem	[6] Using the P.T. to find the Distance between 2 points
WEEK 3	[6] Using the P.T. to find the Distance between 2 points	[7] Applying the Pythagorean Theorem	[8] Applications of the Pythagorean Theorem	[8] Applications of the Pythagorean Theorem	
WEEK 4	[9] Classifying the Real Number System	[9] Classifying the Real Number System	[10] Decimal Representations of Rational Numbers	[11] Converting from Decimals to Fractions	[12] Classifying and Ordering Real Numbers
WEEK 5			[1] Introduction to Transform.	[1] Introduction to Transform.	[2] Pictures and Transformations
WEEK 6	[2] Pictures and Transformations	[3] Translations	[4] Reflections		[5] Rotations
WEEK 7	[6] Dilations	[7] Representing and Combining Transformations	[7] Representing and Combining Transformations		
WEEK 8	[1] Interpreting Expressions	[2] Solving Equations	[2] Solving Equations	[3] Matching Equations & Real-World Scenarios	
WEEK 9					

MATH 8

Scope and Sequence – 2nd 9 Weeks

Unit 4: Functions	Unit 5: Analyzing & Interpreting Functions

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
WEEK 1	[1] Function/Not a Function	[1] Function/Not a Function	[2] Dependent and Independent Variables	[3] Connecting a Verbal Description to Table & Graph	[4] Rule of 4
WEEK 2	[4] Rule of 4	[4] Rule of 4	[5] Use Tables and Graphs to Determine Better Deal	[5] Use Tables and Graphs to Determine Better Deal	[6] Comparing Functions
WEEK 3	[6] Comparing Functions		[7] Defining Linear and Nonlinear Functions	[7] Defining Linear and Nonlinear Functions	[8] Qualitative Descriptions
WEEK 4	[8] Qualitative Descriptions	[9] NMSI: The Water Park	[9] NMSI: The Water Park		
WEEK 5		[1] Proportional Relationships	[2] Introduction to Slope	[3] Counting for Slope	[4] NMSI – Calculating Average Rates of Change
WEEK 6	[4] NMSI – Calculating Average Rates of Change	[5] Finding Slope from Two Coordinates	[5] Finding Slope from Two Coordinates		[6] Stacking Cups
WEEK 7	[7] Graphing Using Tables	[7] Graphing Using Tables	[8] Graphing Full Body Style	[8] Graphing Full Body Style	[9] Writing an Equation of a Line
WEEK 8	[9] Writing an Equation of a Line	[10] Slopes of Parallel Lines	[11] Comparing Linear Functions		
WEEK 9					

MATH 8

Scope and Sequence – 3rd 9 Weeks

Unit 6: Solving Multi-Step Equations	Unit 7: Systems of Equations	Unit 8: Statistics

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
WEEK 1	[1] Visual Models of Equations	[2] Writing Equations from Visual Models	[3] Solving Multi Step Equations	[3] Solving Multi Step Equations	[3] Solving Multi Step Equations
WEEK 2	[3] Solving Multi Step Equations	[4] Structured Practice Session for Solving Eq.	[4] Structured Practice Session for Solving Eq.	[4] Structured Practice Session for Solving Eq.	[5] One Solution, No Solution, infinitely Many Solutions
WEEK 3	[5] One Solution, No Solution, infinitely Many Solutions			[1] Intro to Systems of Equations	[2] What's the Point
WEEK 4	[2] What's the Point	[3] Solving Systems Graphically	[3] Solving Systems Graphically	[3] Solving Systems Graphically	[4] Introduction to Substitution
WEEK 5	[4] Introduction to Substitution	[5] Substitution Practice & Solve Equations w/ the Distributive Prop.	[5] Substitution Practice & Solve Equations w/ the Distributive Prop.	[5] Substitution Practice & Solve Equations w/ the Distributive Prop.	[6] Applications of Systems of Equations
WEEK 6	[6] Applications of Systems of Equations	[7] Find the Better Deal			[1] Scatterplot Basics
WEEK 7	[2] Fit Fights/ Write the Equation of the Line of Best Fit	[3] Analyzing Scatterplots	[3] Analyzing Scatter Plots	[4] Scatterplot Investigations	[4] Scatterplot Investigations
WEEK 8	[5] Barbie Bungee	[5] Barbie Bungee	[6] Associations between Categorical Variables	[6] Associations between Categorical Variables	[7] Structured Practice: Two Way Tables
WEEK 9					

MATH 8

Scope and Sequence – 4th 9 Weeks

Unit 9: Angle Relationships	Unit 10: Volume	Unit 11: Exponents and Scientific Notation

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
WEEK 1	[1] Sum of the Interior Angles of a Triangle	[1] Sum of the Interior Angles of a Triangle	[2] Additional Practice w/ Angles of a Triangle	[3] Parallel Lines, Transversals and Angles	[3] Parallel Lines, Transversals and Angles
WEEK 2	[3] Parallel Lines, Transversals and Angles	[4] Parallel Lines, Transversals and Angles Practice	[4] Parallel Lines, Transversals and Angles Practice		
WEEK 3				[1] Solids of Revolution	[1] Solids of Revolution
WEEK 4	[2] Volume of Cones, Cylinders and Spheres	[2] Volume of Cones, Cylinders and Spheres	[2] Volume of Cones, Cylinders and Spheres	[3] Applications of Volume	[3] Applications of Volume
WEEK 5	[4] Water Tanks and Sand Piles	[4] Water Tanks and Sand Piles			[1] Properties of Exponents
WEEK 6	[1] Properties of Exponents	[1] Properties of Exponents	[1] Properties of Exponents	[2] Scientific Notation	[3] Operations with Numbers written in Sci. Notation
WEEK 7	[4] Applications of Scientific Notation	[4] Applications of Scientific Notation	[4] Applications of Scientific Notation	[5] Scientific Notation in Context	[5] Scientific Notation in Context
WEEK 8					
WEEK 9					

MATH 8

Unit Overview

UNIT 1: Pythagorean Theorem and the Real Number System	RECOMMENDED TIME FRAME: 20 days

UNIT OVERVIEW

In this unit, students learn how to estimate square roots, use and apply the Pythagorean Theorem and its converse, as well as classify numbers within the real number system. The unit begins with an introduction to finding and estimating square roots before transitioning to a series of lessons on the Pythagorean Theorem. At the end of the unit, students return to estimating square roots to discuss the distinction between rational and irrational numbers. Finally, students classify numbers and estimate their value on a number line, combining their skills from the beginning and end of the unit.

STANDARDS

1. Define the real number system as composed of rational and irrational numbers.
a. Explain that every number has a decimal expansion; for rational numbers, the decimal expansion repeats or terminates.
b. Convert a decimal expansion that repeats into a rational number.
2. Locate rational approximations of irrational numbers on a number line, compare their sizes, and estimate the values of the irrational numbers.
4. Use square root and cube root symbols to represent solutions to equations.
a. Evaluate square roots of perfect squares (less than or equal to 225) and cube roots of perfect cubes (less than or equal to 1000).
b. Explain that the square root of a non-perfect square is irrational.
26. Informally justify the Pythagorean Theorem and its converse.
27. Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.
28. Apply the Pythagorean Theorem to determine unknown side lengths of right triangles, including real-world applications.

RESOURCES

Unit 1 Student Progress Monitoring Document

Unit 1 Proficiency Scale

Unit 1 Sample Summative Assessment

Unit 1 Sample Summative Assessment Key

UNIT 2: Transformations	RECOMMENDED TIME FRAME: 13 days

UNIT OVERVIEW

In this unit, students learn how to identify and perform four transformations: translations, reflections, rotations, and dilations. Students begin by practicing each of the three rigid transformations before applying them in a series of lessons. Included in these lessons are activities in which students identify the transformation or series of transformations that have been used to make a new figure from an original. Finally, students perform dilations and analyze what attributes of a shape change (area, perimeter) and what attributes remain the same (angles). By the end of this unit students should be able to perform and identify all four transformations. Because this is the first-time students have been exposed to transformations on a coordinate plane, students need to investigate the transformations using a variety of tools (such as patty paper, Desmos, Geogebra, or translucent sticky notes) rather than just memorizing the rules.

STANDARDS

22. Verify experimentally the properties of rigid motions (rotations, reflections, and translations): lines are taken to lines, and line segments are taken to line segments of the same length; angles are taken to angles of the same measure; and parallel lines are taken to parallel lines.
    a. Given a pair of two-dimensional figures, determine if a series of rigid motions maps one figure onto the other, recognizing that if such a sequence exists the figures are congruent; describe the transformation sequence that verifies a congruence relationship.
23. Use coordinates to describe the effect of transformations (dilations, translations, rotations, and reflections) on two-dimensional figures.
24. Given a pair of two-dimensional figures, determine if a series of dilations and rigid motions maps one figure onto the other, recognizing that if such a sequence exists the figures are similar; describe the transformation sequence that exhibits the similarity between them.

RESOURCES

Unit 2 Student Progress Monitoring Document

Unit 2 Proficiency Scale

Unit 2 Sample Summative Assessment

Unit 2 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 3: Solving Equations Conceptionally	RECOMMENDED TIME FRAME: 5 days

UNIT OVERVIEW

In this unit, students learn to read and interpret algebraic expressions. They then apply that understanding of expressions to solve equations by working backwards through the order of operations. This mini-unit is focused specifically on solving equations where the variable appears in one location, which is why it is not a long sequence of instruction. Equations with variables on both sides, as well as equations that involve the distributive property and combining like terms, will be embedded throughout later units in the school year.

STANDARDS

7. Solve multi-step linear equations in one variable, including rational number coefficients~~, and equations that require using the distributive property and combining like terms.~~

RESOURCES

Unit 3 Student Progress Monitoring Document

Unit 3 Proficiency Scale

Unit 3 Sample Summative Assessment

Unit 3 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 4: Functions	RECOMMENDED TIME FRAME: 21 days

UNIT OVERVIEW

In this unit, students will explore functions. Students will understand the difference between dependent and independent variables. The students will then move to creating tables and graphs of relationships to identify patterns and recognize features of functions. Students will also compare functions to see which represents a better deal and compare and contrast the graphs of different functions. Students will also develop an understanding of what functions truly are and how to determine what is and what is not a function.

STANDARDS

13. Determine whether a relation is a function, defining a function as a rule that assigns to each input (independent value) exactly one output (dependent value), and given a graph, table, mapping, or set of ordered pairs.
14. Evaluate functions defined by a rule or an equation, given values for the independent variable.
15. Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions.
    a. Distinguish between linear and nonlinear functions.
16. Construct a function to model a linear relationship between two variables.
    a. Interpret the rate of change (slope) and initial value of the linear function from a description of a relationship or from two points in a table or graph.
17. Analyze the relationship (increasing or decreasing, linear or nonlinear) between two quantities represented in a graph.

RESOURCES

Unit 4 Student Progress Monitoring Document

Unit 4 Proficiency Scale

Unit 4 Sample Summative Assessment

Unit 4 Sample Summative Assessment Key

UNIT 5: Analyzing and Interpreting Functions	RECOMMENDED TIME FRAME: 19 days

UNIT OVERVIEW

In this unit, students will develop a deeper understanding of a function, specifically a linear function, and its graph. This unit begins by looking at proportional relationships where students determine the unit rate or constant of proportionality. The unit then moves on to an introduction of slope and how to find the rate of change in various ways. Students will then explore non-proportional linear relationships where the y-intercept is a starting amount. These two functions are compared in tables, graphs, and equations. Lastly, a function will be analyzed and described according to the relationship between the two quantities represented in a graph.

STANDARDS

7. Determine whether a relationship between two variables is proportional or non-proportional.
8. Graph proportional relationships.
   a. Interpret the unit rate of a proportional relationship, describing the constant of proportionality as the slope of the graph which goes through the origin and has the equation $y=mx$ where m is the slope.
9. Interpret $y=mx+b$ as defining a linear equation whose graph is a line with m as the slope and b as the y-intercept.
   a. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in a coordinate plane.
   b. Given two distinct points in a coordinate plane, find the slope of the line containing the two points and explain why it will be the same for any two distinct points on the line.
   c. Graph linear relationships, interpreting the slope as a rate of change of the graph and the y-intercept as the initial value.
   d. Given that the slopes for two different sets of points are equal, demonstrate that the linear equations that include those two sets of points may have different y-intercepts.
10. Compare proportional and non-proportional linear relationships represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions) to solve real-world problems.
17. Analyze the relationship (increasing or decreasing, linear or non-linear) between two quantities represented in a graph.

RESOURCES
Unit 5 Student Progress Monitoring Document
Unit 5 Proficiency Scale
Unit 5 Sample Summative Assessment
Unit 5 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 6: Solving Equations with Variables on Both Sides	RECOMMENDED TIME FRAME: 13 days

UNIT OVERVIEW

In this unit, students learn how to solve an equation with variables on both sides by connecting those equations to a visual model. In 7th grade, students learned how to solve equations with variables on one side of the equation. Students need to understand how to solve equations with variables on both sides because in Algebra 1, this skill will be applied when solving a system of equations.

STANDARDS

11. Solve multi-step linear equations in one variable, including rational number coefficients, and equations that require using the distributive property and combining like terms.
    a. Determine whether linear equations in one variable have one solution, no solution, or infinitely many solutions of the form $x = a, a = a, or\ a = b$(where a and b are different numbers)
    b. Represent and solve real-world mathematical problems with equations and interpret each solution in the context of the problem.

RESOURCES

Unit 6 Student Progress Monitoring Document

Unit 6 Proficiency Scale

Unit 6 Sample Summative Assessment

Unit 6 Sample Summative Assessment Key

UNIT 7: Systems of Equations	RECOMMENDED TIME FRAME: 16 days

UNIT OVERVIEW

This unit begins with a lesson similar to two from the fourth unit where students had to fill in a table, write equations to represent the problem situation, graph the equations, and then use the table and graph to answer questions. Students then discover that the point of intersection of the graphs of the equations representing the problem situation is the same as the point where the two equations are equal, which is also the solution to a system of equations. At this point, the lessons have not used the term "system of equations," but it is a good point to introduce it. Students' progress between two of the three methods for solving systems – graphically and by substitution – as they discover the need or usefulness of each of the methods. Time is given for students to practice each of the methods individually before asking them to solve a system while choosing which method is more appropriate. Attention should be given to the form of the equation used so that students will see the different forms (slope-intercept and standard form) they will be exposed to in current and future math classes. Students will be introduced to solving equations using the Distributive Property within the lesson practicing the substitution method because this is where students first have a reason to solve equations in this format.
Time is given for students to practice this skill here as well.

STANDARDS

12. Solve systems of two linear equations in two variables by graphing and substitution.
    a. Explain that the solution(s) of systems of two linear equations in two variables corresponds to points of intersection on their graphs because points of intersection satisfy both equations simultaneously.
    b. Interpret and justify the results of systems of two linear equations in two variables (one solution, no solution, or infinitely many solutions) when applied to real-world and mathematical problems.

RESOURCES

Unit 7 Student Progress Monitoring Document

Unit 7 Proficiency Scale

Unit 7 Sample Summative Assessment

Unit 7 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 8: Statistics	RECOMMENDED TIME FRAME: 13 days

UNIT OVERVIEW

Students gather, organize, analyze, and interpret bivariate numerical and categorical data in this unit. Scatter plots are created to determine type and degree of association for numerical data. Two-way frequency and relative frequency tables are created to determine association of categorical data.

STANDARDS

18. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities, describing patterns in terms of positive, negative, or no association, linear and nonlinear association, clustering, and outliers.
19. Given a scatter plot that suggests a linear association, informally draw a line to fit the data, and assess the model fit by judging the closeness of the data points to the line.
20. Use a linear model of a real-world situation to solve problems and make predictions.
    a. Describe the rate of change and y-intercept in the context of a problem using a linear model of a real-world situation.
21. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects, using relative frequencies calculated for rows or columns to describe possible associations between the two variables.

RESOURCES

Unit 8 Student Progress Monitoring Document

Unit 8 Proficiency Scale

Unit 8 Sample Summative Assessment

Unit 8 Sample Summative Assessment Key

UNIT 9: Angle Relationships	RECOMMENDED TIME FRAME: 13 days

UNIT OVERVIEW

In this unit students explore the relationships of angles formed by triangles as well as by transversals intersecting parallel lines. The relationship between the interior angles of a triangle is explored to establish facts about the sum of the interior angles of a triangle.

STANDARDS

25. Analyze and apply properties of parallel lines cut by a transversal to determine missing angle measures.
    a. Use informal arguments to establish that the sum of the interior angles of a triangle is 180 degrees.

RESOURCES

Unit 9 Student Progress Monitoring Document
Unit 9 Proficiency Scale
Unit 9 Sample Summative Assessment
Unit 9 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 10: Volume	RECOMMENDED TIME FRAME: 11 days

UNIT OVERVIEW

Students build on understandings of circles and volume from 7th grade to find the volume of cylinders, cones, and spheres. Students understand the relationship between the volume of a) cylinders and cones and b) cylinders and spheres to the corresponding formulas. (8th Grade Flip Book 2014) Students will use formulas to find the volume of cones, cylinders and spheres while solving real-world problems.

STANDARDS

29. Informally derive the formulas for the volume of cones and spheres by experimentally comparing the volumes of cones and spheres with the same radius and height to a cylinder with the same dimensions.
30. Use formulas to calculate the volumes of three-dimensional figures (cylinders, cones, and spheres) to solve real- world problems.

RESOURCES

Unit 10 Student Progress Monitoring Document

Unit 10 Proficiency Scale

Unit 10 Sample Summative Assessment

Unit 10 Sample Summative Assessment Key

MATH 8

Unit Overview

UNIT 11: Exponents and Scientific Notation	RECOMMENDED TIME FRAME: 13 days

UNIT OVERVIEW

In 6th grade, students demonstrate the meaning of exponents in writing and evaluating numerical expressions with whole number exponents. The base can be a whole number, a positive decimal, a positive fraction, or variable. In 8th grade, students extend their knowledge of exponents to include properties of exponents. Students then apply those properties as they solve problems using scientific notation.

STANDARDS

3. Develop and apply properties of integer exponents to generate equivalent numerical and Algebraic expressions.
5. Estimate and compare very large or very small numbers in scientific notation.
6. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.
   a. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.
   b. Interpret scientific notation that has been generated by technology.

RESOURCES

Unit 11 Student Progress Monitoring Document

Unit 11 Proficiency Scale

Unit 11 Sample Summative Assessment

Unit 11 Sample Summative Assessment Key