EAST PENN SCHOOL DISTRICT

Course Name:

Math Foundations

Curriculum Proposal Date:

February 26, 2024

Curriculum Developed by:

Kira Kern, Omar Haddad

Course description

This course reinforces foundational math concepts needed for success in Fundamentals of Algebra and Algebra 1. Students are placed into this course based on individual data, teacher recommendation, and data based on their 3-8 performance on state standardized testing. Through ongoing data collection, students will receive instruction designed to challenge them based on their needs and to provide remediation and/or enrichment when appropriate. The topics include arithmetic operations, number system, fractions, math facts, ratios, proportions, expressions, exponents, basic geometry, statistics, probability, graphing coordinates and deciphering word problems. The focus is on learning the conceptual understandings of mathematical processes and basic computational procedures.

ALGEBRA 1 - NUMBER SYSTEM

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

CC.2.2.HS.F.1 - Apply and extend the properties of exponents to solve problems with rational exponents.

CC.2.1.7.E.1
Apply and extend previous understandings of operations with fractions to operations with rational numbers.

CC.2.1.6.E.3
Develop and/or apply number theory concepts to find common multiples.

Transfer

Students will be able to independently use their learning to keep considering...

- ❑ Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations
- ❑ Use reasoning to solve equations and justify the solution method
- ❑ Write expressions in equivalent forms to solve problems

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Mathematical relationships among numbers can be represented, compared, and communicated.
- ❑ Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.
- ❑ Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.
- ❑ Patterns exhibit relationships that can be extended, described, and generalized.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How is mathematics used to quantify, compare, represent, and model numbers?
- ❑ How can mathematics support effective communication?
- ❑ How are relationships represented mathematically?
- ❑ What does it mean to estimate or analyze numerical quantities?
- ❑ How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
- ❑ What makes a tool and/or strategy appropriate for a given task?
- ❑ How can patterns be used to describe relationships in mathematical situations?

Acquisition

Students will know...

- ❑ Rational Numbers
- ❑ Properties of operations
- ❑ Number line
- ❑ Terminating decimal
- ❑ Greatest common factor
- ❑ Least common multiple

Students will be skilled at...

- ❑ Apply properties of operations to add and subtract rational numbers, including real-world contexts.
- ❑ Represent addition and subtraction on a horizontal or vertical number line.

	❑ Integers	❑ Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. ❑ Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. ❑ Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). ❑ Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., – (– 3) = 3; 0 is its own opposite).

ALGEBRA 1 - FUNCTIONS

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution needed.
CC.2.2.HS.C.2 - Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.1.7.D.1

Transfer

Students will be able to independently use their learning to keep considering...

- ❑ Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations
- ❑ Use reasoning to solve equations and justify the solution method
- ❑ Write expressions in equivalent forms to solve problems

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Mathematical relationships among numbers can be represented, compared, and communicated.
- ❑ Mathematical relationships can be represented as

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How is mathematics used to quantify, compare, represent, and model numbers?
- ❑ How can mathematics support effective communication?
- ❑ How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?

Analyze proportional relationships and use them to model and solve real-world and mathematical problems. CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.	expressions, equations and inequalities in mathematical situations.	
	Acquisition	
	Students will know... ❑ Unit rate ❑ Ratio ❑ Proportional Relationships ❑ Constant ❑ Ordered Pair ❑ Origin ❑ Coordinate Plane	*Students will be skilled at...* ☐ Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. ☐ Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin). ☐ Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. ☐ 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. ☐ Use proportional relationships to solve multi-step ratio and percent problems. Locate and plot integers and other rational numbers on a horizontal or vertical number line; locate and plot pairs of integers and other rational numbers on a coordinate plane

ALGEBRA 1 - SOLVING EQUATIONS AND INEQUALITIES

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards	Transfer
CC.2.2.HS.D.7 - Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 - Apply inverse operations to solve equations or formulas for a given variable.	*Students will be able to independently use their learning to keep considering...* ❑ Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations ❑ Use reasoning to solve equations and justify the solution method ❑ Write expressions in equivalent forms to solve problems
	Meaning

CC.2.2.HS.D.9 - Use reasoning to solve equations and justify the solution needed. CC.2.2.HS.C.2 - Graph and analyze functions and use their properties to make connections between the different representations. CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. CC.2.1.6.E.1 Apply and extend previous understandings of multiplication and division to divide fractions by fractions. CC.2.2.6.B.1 - Apply and extend previous understandings of arithmetic to algebraic expressions. CC.2.2.7.B.3 - Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.	UNDERSTANDINGS *Students will understand that...* ❑ Mathematical relationships among numbers can be represented, compared, and communicated. ❑ Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	ESSENTIAL QUESTIONS *Students will keep considering...* ❑ How is mathematics used to quantify, compare, represent, and model numbers? ❑ How can mathematics support effective communication? ❑ How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
	Acquisition	
	Students will know... ❑ Quotient of fractions ❑ Expression ❑ Exponent ❑ Sum ❑ Term ❑ Product ❑ Factor ❑ Quotient ❑ Coefficient ❑ Quantity ❑ Evaluate expressions ❑ Properties of operations ❑ Distributive property	*Students will be skilled at...* ❑ Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions. ❑ Write and evaluate numerical expressions involving whole-number exponents. ❑ Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity). ❑ Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems. ❑ Apply the properties of operations to generate equivalent expressions.

ALGEBRA 1 - PROBABILITY AND STATISTICS

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards	Transfer
CC.2.4.HS.B.1 - Summarize, represent, and interpret data on a single count or measurement variable.	*Students will be able to independently use their learning to keep considering...* ❑ Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations

CC.2.4.HS.B.2 - Summarize, represent, and interpret data on two categorical and quantitative variables.
CC.2.4.HS.B.3 - Analyze linear models to make interpretations based on the data.
CC.2.4.HS.B.4 - Recognize and evaluate random processes underlying statistical experiments.
CC.2.4.HS.B.5 - Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
CC.2.4.7.B.1 - Draw inferences about populations based on random sampling concepts.
CC.2.4.7.B.2 - Draw informal comparative inferences about two populations.
CC.2.4.7.B.3 - Investigate chance processes and develop, use, and evaluate probability models.

- ❑ Use reasoning to solve equations and justify the solution method
- ❑ Write expressions in equivalent forms to solve problems

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.
- ❑ Measurement attributes can be quantified, and estimated using customary and noncustomary units of measure.
- ❑ Patterns exhibit relationships that can be extended, described, and generalized.
- ❑ Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
- ❑ Data can be modeled and used to make inferences.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted?
- ❑ How precise do measurements and calculations need to be?
- ❑ How can patterns be used to describe relationships in mathematical situations?
- ❑ How can recognizing repetition or regularity assist in solving problems more efficiently?
- ❑ How can data be organized and represented to provide insight into the relationship between quantities?
- ❑ How does the type of data influence the choice of display?
- ❑ How can probability and data analysis be used to make predictions?

Acquisition

Students will know...

- ❑ Sample
- ❑ Random sample
- ❑ Inferences
- ❑ Predict outcomes

Students will be skilled at...

- ❑ Determine whether a sample is a random sample given a real-world situation.
- ❑ Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., 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).

ALGEBRA 1 - GEOMETRY

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

CC.2.3.HS.A.12 - Explain volume formulas and use them to solve problems.
CC.2.3.HS.A.6 - Verify and apply theorems involving similarity as they relate to plane figures
CC.2.3.HS.A.7 - Apply trigonometric ratios to solve problems involving right triangles.
CC.2.3.HS.A.11 - Apply coordinate geometry to prove simple geometric theorems algebraically.
CC.2.3.6.A.1 - Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.
CC.2.3.7.A.1 - Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.

Transfer

Students will be able to independently use their learning to keep considering...

- ❑ Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations
- ❑ Use reasoning to solve equations and justify the solution method
- ❑ Write expressions in equivalent forms to solve problems

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.
- ❑ Patterns exhibit relationships that can be extended, described, and generalized.
- ❑ Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?
- ❑ How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
- ❑ How can patterns be used to describe relationships in mathematical situations?
- ❑ How can recognizing repetition or regularity assist in solving problems more efficiently?
- ❑ How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?

Acquisition

Students will know...

- ❑ Area of triangles and special quadrilaterals
- ❑ Vertices

Students will be skilled at...

- ❑ Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided.

	❑ Side lengths ❑ Three-dimensional figures ❑ Surface area of triangular and rectangular prisms	❑ Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided. ❑ Represent three-dimensional figures using nets made of rectangles and triangles. ❑ Determine the surface area of triangular and rectangular prisms