EASD Math Scope and Sequence – 6TH Grade

1ST MARKING PERIOD					
CURRICULUM MAP	LEARNING MODULE	Standards for Mathematical Content	Standards for Mathematical Practice	Approx. Weeks	Comments
The Number System – Whole Numbers & Decimals	Multi-Digit Computation (4 operations)			4.5	
The Number System – Fractions	Common Factors & Multiples			1	
	Dividing Fractions			3.5	

2ND MARKING PERIOD					
CURRICULUM MAP	LEARNING MODULE	Standards for Mathematical Content	Standards for Mathematical Practice	Approx. Weeks	Comments
The Number System – Rational Numbers	Extending the Number System (Integers)			1	
	Absolute Value and Ordering Rational Numbers			1	
	Relationships in the Coordinate Plane			1	
Ratios & Proportions	Ratios and Unit Rates			1.5	
	Application of Ratios and Rates			2	
	Reasoning Proportionally with Percents			2.5	

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3RD MARKING PERIOD					
CURRICULUM MAP	LEARNING MODULE	Standards for Mathematical Content	Standards for Mathematical Practice	Approx. Weeks	Comments
Expressions & Equations	Relationships among Variables and Quantities			2	
	Algebraic Expressions			3	Distributive and Operation Properties
	Understanding Equations and Inequalities			2	
	Writing and Solving Equations and Inequalities			2	

4TH MARKING PERIOD					
CURRICULUM MAP	LEARNING MODULE	Standards for Mathematical Content	Standards for Mathematical Practice	Approx. Weeks	Comments
Geometry	Problem Solving with Area in 2-D Shapes			2	
	Problem Solving with Volume and Surface Area			3	
Statistics & Probability	Data Distributions			2	
	Analyzing Data			2	

EASD Math Scope and Sequence – 6TH Grade

Grade/Course: Sixth Grade: The Number System—Whole Numbers and Decimals

Big Idea:

- For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra.
- The use of equivalence in the operation of basic facts and procedures simplifies calculations.

Pennsylvania Core Standards:

CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers. (with or without a calculator)

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:

Why is it useful to break whole numbers and decimals into equal parts and how is it done?

Why is it important to demonstrate fluency of decimal operations in real-world situations and how is it shown?

How can estimation be used to check accuracy of calculations?

Understandings: Students will understand THAT . . .

- a standard division algorithm can be useful when solving real world problems that involve equal grouping by breaking whole numbers into equal parts with or without remainders. (two-digit divisors)
- estimation is a useful tool in finding the reasonableness of calculations.
- Division using a decimal divisor is changed to an equivalent calculation with a whole number divisor by multiplying the divisor and dividend by an appropriate power of ten.
- Money amounts represented as decimals can be added and subtracted using the same algorithms as with whole numbers.

Knowledge:

Compatible numbers
Divisor
Dividend
Quotient
Decimal
Tenths
Hundredths
Thousandths
Addend
Sum
Difference
Missing addend
Factor
Product
Decimal Point
Estimation

Skills:

- **M06.A-N.2.1.1** Solve problems involving operations (all four operations) with whole numbers, decimals (through thousandths), straight computation, or word problems. (including a sum of a whole numbers and a decimal and a decimal and a decimal, a difference of a whole number and a decimal and a decimal and a decimal, a product of a whole number and a decimal and a product of a decimal and a decimal, and a quotient of a whole number and a decimal and a quotient of a decimal and a decimal)

Grade/Course: Sixth Grade: The Number System—Fractions

Big Idea:

- The use of equivalence in the operations of fractions simplifies calculations.
- Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones.

Pennsylvania Core Standards:

CC.2.1.6.E.3 Develop and/or apply number theory concepts to find common factors and multiples.
CC.2.1.6.E.1 Apply and extend previous understanding of multiplication and division to divide fractions by fractions.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:

- How are numbers used that are decomposed into their simplest form?
- How are division and multiplication of fractions related?

Understandings: Students will understand THAT . . .

- Every composite number can be expressed as the product of prime numbers in exactly one way, disregarding the order of the factors.
- the least common multiple can be used with the distributive property to express a sum of two whole numbers
- A fraction division calculation can be changed to an equivalent multiplication calculation.

Knowledge:

Fraction
Reciprocal
Multiplicative inverses
Visual fraction model
Prime numbers
Composite numbers
Greatest common factor
Least common multiple
Relatively prime
Factors
Multiples distributive property
Prime factorization

Skills:

- **M06.A-N.2.2.1** 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.
- **M06.A-N.2.2.2** Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of two whole numbers with no common factor. Ex: Express 36 +8 as 4(9+2).
- **M06.A-N.1.1.1** Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions.
  Ex. 1: Given a story context for (2/3) divided by (3/4) = 8/9 because ¾ of 8/9 is 2/3. (In General, (a/b) divided by (c/d) = (a/b) x (d/c) = ad/bc.)
  Ex. 2: How wide is a rectangular strip of land with length ¾ mi and area ½ square mi?
  Ex. 3: How many 2 ¼-foot pieces can be cut from a 15 ½-foot board?

Grade/Course: Sixth Grade: The Number System—Rational Numbers

Big Idea:

- The set of real numbers is infinite, and each real number can be associated with a unique point on a number line.
- Objects in space can be oriented in an infinite number of ways, and an object's location in space can be described quantitatively.

Pennsylvania Core Standards:

CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:

- Why do we use rational numbers to describe directions and values?
- Why is coordinate graphing effective in locating points on a plane?

Understandings: Students will understand THAT . . .

- Positive and negative numbers are used together to describe quantities having opposite directions or values.
- Each integer can be associated with a unique point on the number line, but there are many points on the number line that cannot be named by integers.
- An integer and its opposite are the same distance from zero on the number line.
- There is no greatest or least integer on the number line.
- The rational numbers can be ordered and that the absolute value of a numbers
- The Cartesian Coordinate System is a scheme that uses two perpendicular number lines intersecting at 0 on each to name the location of points in the plane; the system can be extended to name points in space.
- Every point in the plane can be described uniquely by an ordered pair of numbers; the first number tells the distance to the left or right of zero on the horizontal number line; the second tells the distance above or below zero on the vertical number line.

Knowledge:

Rational numbers
Opposites
Absolute value
Greater than
Less than

Skills:

- **M06.A-N.3.1.1** 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).
- **M06.A-N.3.1.2** 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, and that 0 is its own opposite).

Greater than or equal to Less than or equal to Origin Coordinate plane Ordered pairs X-axis (vertical) Y-axis (horizontal) Coordinates Quadrants Positive numbers Negative numbers Integers Plotting points	• **M06.A-N.3.1.3** 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. • **M06.A-N.3.2.1** Write, interpret, and explain statements of order of rational numbers in real-world contexts. Ex. Write -3 degrees C > -7 degrees C to express the fact that -3 degrees C is warmer than -7 degrees C. • **M06.A-N.3.2.2** Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Ex. For an account balance of -30 dollars, write /-30/ = 30 to describe the size of the debt in dollars, and recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars. • **M06.A-N.3.2.3** Solve real-world and mathematical problems by plotting points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Grade/Course: Sixth Grade: Ratios and Proportional Relationships

Big Idea:

- Numbers, expressions, and measures can be compared by their relative values.
- If two quantities vary proportionally, that relationship can be represented as a linear function.

Pennsylvania Core Standards:

CC.2.1.6.D.1 Understand ratio concepts and use ratio reasoning to solve problems.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:	**Understandings: Students will understand THAT . . .**
How can like and unlike quantities be compared? How is the unit rate used in solving problems? How is percent used to solve problems finding the whole?	• A ratio is a multiplicative comparison of quantities; there are different types of comparisons that can be represented as ratios. • Ratios give the relative sizes of the quantities being compared, not necessarily the actual sizes. • Rates are special types of ratios where unlike quantities are being compared. • Ratios can be expressed as units by finding an equivalent ratio where the second term is one. • When you graph the terms of equal ratios as ordered pairs (first term, second term) and connect the points, the graph is a straight line. • A percent is a special type of ratio where a part is compared to a whole and the whole is 100.
Knowledge: Ratio Relationship Quantities Unit Rate Rate Equivalent ratios Tables Plot	**Skills:** • **M06.A-R.1.1.1** Use ratio language and notation (such as 3 to 4, 3:4, 3/4) to describe a ratio relationship between two quantities. *Example 1: "The ratio of girls to boys in a math class is 2:3, because for every 2 girls there are 3 boys." Example 2: "For every five votes candidate A received, candidate B received four votes."* • **M06.A-R.1.1.2** Find the unit rate a/b associated with a ratio $a:b$ (with $b \neq 0$), and use rate language in the context of a ratio relationship. *Example 1: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." Example 2: "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*

Pairs of values Coordinate plane Compare Unit pricing Constant speed Percent Graph Linear Proportion	• **M06.A-R.1.1.3** Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios. • **M06.A-R.1.1.4** Solve unit rate problems including those involving unit pricing and constant speed. *Example: If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* • **M06.A-R.1.1.5** • Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

Grade/Course: Sixth Grade: Expressions and Equations

Big Idea:

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Pennsylvania Core Standards:

CC.2.2.6.B.1 Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply to real-world and mathematical problems.
CC.2.2.6.B.3 Represent and analyze quantitative relationships between dependent and independent variables.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:

- How are expressions rewritten to represent quantities in different ways?
- How can verbal expressions/sentences and algebraic expressions/equations be translated?
- How are equations that correspond to given situations or represent a give mathematical relationship written?
- In what ways does the use of the order of operations have on solving an equation?
- How can an unknown in an expression be found?
- How are representations used to describe the relationship between quantities?

Understandings: Students will understand THAT . . .

- Letters are used in mathematics to represent generalized properties, unknowns in equations, and relationships between quantities
- Algebraic expressions can be used to represent mathematical situations.
- Exponents represent repeated multiplication of a factor
- A variable represents a number or sets of numbers in writing and reading an expression
- Order of operations dictates the correct process to arrive at the solution of an equation
- The distributive property can be used to write equivalent expressions.
- There is more than one way to solve for the variable that will make the equation true.
- An unknown variable can be found by solving an equal balance.
- Inequalities can be used to represent real world and mathematical situations.
- That there are multiple ways of representing the relationship between quantities (language, a table, an equation, or a graph).

Knowledge:

Exponents
Base
Numerical expressions
Algebraic expressions

Skills:

- **M06.B-E.1.1.1** Write and evaluate numerical expressions involving whole-number exponents.
- **M06.B-E.1.1.2** Write algebraic expressions from verbal descriptions. *Example: Express the description "five less than twice a number" as $2y - 5$.*

Evaluate Sum Difference Product Quotient Term product Factor Quantity Coefficient Constant Like terms Equivalent expressions Variables Distributive property Justifying solutions Substitution Inequalities Equations Greater than >\ Less than <\ Greater than or equal to ≥ Less than or equal to ≤ Profit Exceed Discrete data Relationship Independent variable Dependent variable Continuous data	• **M06.B-E.1.1.3** Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity).*Example: Describe the expression 2(8 + 7) as a product of two factors.* • **M06.B-E.1.1.4** Evaluate expressions at specific values of their variables, including expressions that arise from formulas used in real-world problems.*Example: Evaluate the expression b2 – 5 when b = 4.* • **M06.B-E.1.1.5** Apply the properties of operations to generate equivalent expressions. *Example 1: Apply the distributive property to the expression 3 (2 + x) to produce the equivalentexpression 6 + 3x.Example 2: Apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y). Example 3: Apply properties of operations to y + y + y to produce the equivalent expression 3y.* • **M06.B-E.2.1.1** Use substitution to determine whether a given number in a specified set makes an equation or inequality true. • **M06.B-E.2.1.2** Write algebraic expressions to represent real-world or mathematical problems. • **M06.B-E.2.1.3** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all non-negative rational numbers. • **M06.B-E.2.1.4** Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines. • **M06.B-E.3.1.1** Write an equation to express the relationship between the dependent and independent variables. *Example: In a problem involving motion at a constant speed of 65 units, write the equation d = 65t to represent the relationship between distance and time.* • **M06.B-E.3.1.2** Analyze the relationship between the dependent and independent variables using graphs and tables, and/or relate these to an equation.

Grade/Course: Sixth Grade: Geometry

Big Idea:

- Some attributes of objects are measurable and can be quantified using unit amounts.

Pennsylvania Core Standards:

CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:	**Understandings: Students will understand THAT . . .**
Why is finding the area of any polygon important to problem solving? Why is finding the space that a polyhedra takes up valuable to solving problems?	• A polygon's area is unique to that polygon • The area of an irregular or compound polygon can be found by decomposing that polygon into other polygons. • Volume is the amount of space an object takes up. • Coordinate graphing can be used to find the area of a polygon • Nets of 3-dimensional figures are plane figures • Surface area is the area of faces of a 3-dimensional figure added together. • Measurement involves a selected attribute of an object (area, volume, surface area) and a comparison of the object being measured against a unit of the same attribute.

Knowledge:	**Skills:**
Triangles Quadrilaterals Square Rectangle Parallelogram Rhombus Trapezoid Area Irregular polygons Compound polygons Composing Decomposing	• **M06.C-G.1.1.1** Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). **Formulas will be provided.** • **M06.C-G.1.1.2** Determine the area of irregular or compound polygons. *Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.* • **M06.C-G.1.1.3** Determine the volume of right rectangular prisms with fractional edge lengths. **Formulas will be provided.** • **M06.C-G.1.1.4** 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.** • **M06.C-G.1.1.5** Represent three-dimensional figures using nets made up of rectangles and triangles.

Volume Right rectangular prism Vertices Polygon Plane Nets 3-dimensional figures (faces are rectangles and triangles) Surface area Triangular and rectangular prisms Cubes	• **M06.C-G.1.1.6** Determine the surface area of triangular and rectangular prisms (including cubes). **Formulas will be provided.**

Grade/Course: Sixth Grade: Statistics and Probability

Big Idea:

- Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.
- There are special numerical measures that describe the center and spread of numerical data sets.

Pennsylvania Core Standards:

CC.2.4.6.B.1 Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions.

Standards for Mathematical Practice: Standards for Mathematical Practice:

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

Essential Questions:

How can numerical data be displayed?
Why are measures of central tendency used and how are they found?
How can gathered data be described?

Understandings: Students will understand THAT . . .

- Data can be displayed in a variety of ways and that that is dependent on the data gathered.
- **The best descriptor of the center of a numerical data set (i.e., mean, median, mode) is determined by the nature of the data and the question to be answered.**
- **Outliers affect the mean, median, and mode in different ways.**
- **Data interpretation is enhanced by numerical measures telling how data are distributed.**
- **The manner of displaying data can show any overall pattern and any deviations from the overall pattern.**

Knowledge:

Line plots
Histogram
Box-and-whisker plots
Median
Mean
Mode
Range
Interquartile range
Mean absolute deviation
Quantitative measure of center
Data distribution
Outlier

Skills:

M06.D-S.1.1.1 Display numerical data in plots on a number line, including dot plots, histograms, and box-and- whisker plots.
M06.D-S.1.1.2 Determine quantitative measures of centeral tendencies (e.g., median, mean, and/or mode) and variability (e.g., range, interquartile range, and/or mean absolute deviation).
M06.D-S.1.1.3 Describe any overall pattern and any deviations from the overall pattern with reference to the context in which the data were gathered.
M06.D-S.1.1.4 Relate the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.