Pequannock Township School District Curriculum Syllabus

Mathematics / Grade 6

Course Description:

The sixth grade math course is designed to build upon the prior knowledge from fifth grade to contribute to new topics of study. Multiplication, division, and fractions contribute to their development of ratios, proportions, and unit rates. Students apply the properties of operations to solve variable expressions and equations. Their work with rational numbers extends to include negative numbers. They extend the coordinate plane and use ordered pairs to navigate in a coordinate plane. Students expand their knowledge of measurement data to include data displays in which they describe the distribution and statistical variability.

The goal of the sixth grade mathematics course is to transition students from elementary school to middle school. Students are encouraged to develop higher level thinking skills and to improve logical reasoning skills. Positive attitudes and metacognition, attributes that are the center of the Standards for Mathematical Practice, are stimulated. Students are taught to read attentively and to apply various processes to mathematical problem solving. Note-taking and study skills are emphasized at the sixth grade level to prepare students for their secondary education. Lessons are taught to help students connect concepts to the outside world and across multiple curriculums. Classroom instruction is aligned to developing 21st century learning skills, such as critical thinking, problem solving, collaboration, and accountability.

Course Standards:

The following is a list of proficiencies that describe what students are expected to know and be able to do as a result of successfully completing this course. The following proficiencies are the basis of the assessment of student achievement. The learner will demonstrate mastery of:

Ratios, Rates and Percents

1. Understand ratio concepts and use ratio reasoning to solve problems.
   6.RP.A.1, 6.RP.A.2, 6.RP.A.3a-d

The Number System

2. Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
   6.NS.A.1
3. Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.B.2, 6.NS.B.3, 6.NS.B.4
4. Apply and extend previous understandings of numbers to the system of rational numbers.
   6.NS.C.5, 6.NS.C.6a-c, 6.NS.C.7a-d, 6.NS.C.8

Expressions and Equations
5. Apply and extend previous understandings of arithmetic to algebraic expressions.
   6.EE.A.1, 6.EE.A.2a-c, 6.EE.A.3, 6.EE.A.4
6. Reason about and solve one-variable equations and inequalities.   *6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8*
7. Represent and analyze quantitative relationships between dependent and independent variables.
   6.EE.C.9

Geometry
8. Solve real-world and mathematical problems involving area, surface area, and volume.
   6.G.A.1, 6.G.A.2, 6.G.A.3, 6.G.A.4

Statistics
9. Develop understanding of statistical variability.
   6.SP.A.1, 6.SP.A.2, 6.SP.A.3
10. Summarize and describe distributions.   *6.SP.B.4, 6.SP.B.5a-d*

Standards for Mathematical Practice
1. Make sense of problems and persevere in solving them. *SMP1*
2. Reason abstractly and quantitatively. *SMP2*
3. Construct viable arguments and critique the reasoning of others. *SMP3*
4. Model with mathematics. *SMP4*
5. Use appropriate tools strategically. *SMP5*
6. Attend to precision. *SMP6*
7. Look for and make use of structure. *SMP7*
8. Look for and express regularity in repeated reasoning. *SMP8*

Scope and Sequence

Unit 1: Integers and Rational Numbers (Trimester 1)

Students begin the course strengthening their number sense by representing rational numbers as points on a number line. Students recognize the extension of the number line to the left of zero and use negative numbers to describe real world contexts. Absolute value, opposites, and the components of the coordinate plane are learned. Students will graph on a coordinate

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plane to find distances between points and reflections of points. Students extend their understanding of number system concepts from previous grades to extend to division of a fraction by a fraction, operations with decimals, and multi-digit division. Students understanding of operations with fractions and decimals will be demonstrated through application to solve problems in context.

The development of number sense centered about a number line is essential to students' understanding of value in all rational numbers. Students will further develop their concept of a number line inclusive of negative quantities. Students will apply this to finding and locating coordinates on a coordinate plane. Students need to learn the principles of the coordinate plane to further develop their algebraic and geometric skills. Students need to understand visual models of fraction and decimal operations to continue to develop their number sense.

Unit 2: Expressions, Equations, and Inequalities (Trimesters 1 and 2)

Students write and evaluate numerical expressions involving whole-number exponents, demonstrating mastery of correct order of operations. Students further develop their knowledge of common factors and multiples, including find the greatest common factor and the least common multiple among a set of numbers. Students extend this knowledge to writing, reading, and evaluating expressions using variables, i.e. letters that stand for numbers, as well as identifying parts of an expression e.g. sum, term, product, factor, variable, coefficient. Students will express verbal phrases and sentences as algebraic expressions and equations, and then evaluate the expressions at specific values of their variables. The distributive property will be integrated throughout the unit, and will be used to generate equivalent expressions, as well as identify equivalent expressions. Students will understand that solving an equation or inequality as answering the question, what value(s) make the statement true. Students will extend this knowledge to use variables to write and solve expressions, equations, and inequalities to solve real world and mathematical problems. Finally, students will use two variables to represent real world problems that change in relationship to one another, and recognize the concept of dependent and independent variables.

Students need to be able to represent real world situations using variables to apply abstract thinking skills to concrete examples. An understanding of factors and multiples is necessary for proficiency in fractional operations. This unit is necessary to develop algebraic skills.

Unit 3: Ratio, Rate, and Percent (Trimesters 2 and 3)

Students understand the concept of a ratio as a relationship between two quantities and use ratio language to describe that relationship. Students extend their knowledge of ratios to understand rates and unit rates and apply this knowledge to solve real world problems. Students find the percent of a quantity; solve problems using percents, and use ratio reasoning to convert measurement units.

Students need to understand ratios, rates, and percentages as a comparison of two quantities

in order to expand their number sense and understand the real world relevance and solve real world problems

Unit 4: Geometry and Data (Trimester 3)

Students solve real-world and mathematical problems involving area, surface area, and volume. Students find area and volume of two- and three-dimensional figures and apply these techniques to solving real world and mathematical problems. Students use nets consisting of rectangles and triangles to represent three-dimensional figures to find surface area of these solids. They develop understanding of statistical variability. Statistics summarizes data so that information or decisions can be gathered from the data. Measures of central tendency can be used to summarize data distributions, and help students make decisions in real-world problems. Students need to develop the awareness that two dimensional figures can be split up to form other figures in order to understand the how to find the area. Also, students must be able to recognize a net as a flat representation of a solid in order to understand the formula for surface area and apply it in a real world context. The creation and analysis of data displays is essential to students' understanding of interpreting data and recognizing skewed data.

Assessments

Evaluation of student achievement in this course will be based on the following:

   a. Observational data collected by teachers as students are learning
   b. Formative assessments given by teachers to gauge progress toward each standard

Curriculum Resources

Instructional Resources:
enVision Math Grade 6 Common Core

Additional Technology Resources:
Illustrative Mathematics: www.illustrativemathematics.org
Open-Up Resources: https://im.openupresources.org/6/teachers/index.html
NC Lessons for Learning: http://tools4ncteachers.com/sixth-grade/
Georgia Lessons for Grade 6: https://www.georgiastandards.org/Georgia-Standards/Pages/Math-6-8.aspx

Home and School Connection

The following are suggestions and/or resources that will help parents support their children:
   ● Tutorials
      ○ https://www.khanacademy.org/

- Learn Zillion
  - https://learnzillion.com/resources/75114-math/

- IXL Math https://www.ixl.com/math/grade-6

- EnVision Math series
  - www.pearsonrealize.com
    - Educational games
    - Online tutorials for each lesson (Virtual Nerd videos)