

# Math 6 Overview - Course 3151

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## **Cover Page**

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### **EAST BRUNSWICK PUBLIC SCHOOLS**

**East Brunswick New Jersey**

**Superintendent of Schools**

Dr. Victor P. Valeski

### **Mathematics**

**Math 6** - Course Number: 3151

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**Curriculum Adoption:** 11/2/17

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## Course Overview

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### COURSE DESCRIPTION:

The mission of the mathematics curriculum is for students to communicate, make connections, reason and represent the world quantitatively in order to pose and solve problems. At grade six, students will expand the scope of problems for which they can use multiplication and division to solve to include problems involving fractions and rates. Students will also further their understanding of multiplication and division, and fractions to deepen their knowledge of why procedures work. Students will also expand their knowledge of variables to write expressions and use expressions and equations to model. Students will know learn to use properties of equality to find solutions to equations. In grade six, students will also expand their beginning understanding of statistics to understand that the measure of variability (mean absolute deviation and interquartile range) along with the measure of center (median and mean) determine the shape of the distribution.

## Textbooks and other resources

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**Textbook:** McGraw-Hill Education, Everyday Math Grade 6 (4th Edition) by The University of Chicago Math Project (2015)

- Teacher's Resource Package, Student Journal, Home Links and online resources accompanying text
- Website: <http://everydaymath.uchicago.edu/parents/6th-grade/>
- MHID: 0076754898; ISBN 13: 9780076754892

- TI-34 Scientific Calculator

## Units

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### COURSE SCOPE AND SEQUENCE

Unit	Time Frame	Marking Period Guide
Data Displays and Number Systems	6 weeks	1
Fraction Operations and Ratios	5 - 6 weeks	1 & 2
Decimal Operations and Percent	5-6 weeks	2
Algebraic Expressions and Equations	5 weeks	3
Area and Volume Explorations	4 weeks	3
Equivalent Expressions and Solving Equations	4 weeks (Fairview)	4
Variables and Algebraic Relationships	5 weeks (Final)	4

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## Math Standards

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### Grade Six Focus:

#### Instructional time should focus on four critical areas:

- Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
- Completing understanding of division of fractions and extending the notion of number to the system of rational numbers (including negatives)
- Writing, interpreting and using expressions and equations
- Developing understanding of statistical thinking

### Grade Six Overview

#### Ratios and Proportional Relationships

- Understand ratio concepts and use ratio reasoning to solve problems.

### **The Number System**

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

### **Expressions and Equations**

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

### **Geometry**

- Solve real-world and mathematical problems involving area, surface area, and volume.

### **Statistics and Probability**

- Develop understanding of statistical variability.
- Summarize and describe distributions.

### **Standards for Mathematical Practice:**

- MP1.** Make sense of problems and persevere in solving them.
- MP2.** Reason abstractly and quantitatively.
- MP3.** Construct viable arguments and critique the reasoning of others.
- MP4.** Model with mathematics.
- MP5.** Use appropriate tools strategically.
- MP6.** Attend to precision.

**MP7.** Look for and make use of structure.

**MP8.** Look for and express regularity in repeated reasoning

MA.6.6	In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.
MA.6.6.1	Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.
MA.6.6.2	Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.
MA.6.6.3	Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$ ) to describe relationships between quantities.
MA.6.6.4	Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.
MA.6.G	Geometry
MA.6.G.A	Solve real-world and mathematical problems involving area, surface area, and

volume.

MA.6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MA.6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
MA.6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
MA.6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
MA.6.6A	Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.
MA.6.EE	Expressions and Equations
MA.6.EE.A	Apply and extend previous understandings of arithmetic to algebraic expressions.
MA.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
MA.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
MA.6.EE.A.2a	Write expressions that record operations with numbers and with letters standing for numbers.
MA.6.EE.A.2b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
MA.6.EE.A.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
MA.6.EE.B	Reason about and solve one-variable equations and inequalities.
MA.6.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a

specified set makes an equation or inequality true.

MA.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MA.6.EE.B.7	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 nonnegative rational numbers.
MA.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MA.6.EE.C	Represent and analyze quantitative relationships between dependent and independent variables.
MA.6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
MA.6.NS	The Number System
MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MA.6.NS.B	Compute fluently with multi-digit numbers and find common factors and multiples.
MA.6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
MA.6.NS.B.4	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. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
MA.6.NS.C	Apply and extend previous understandings of numbers to the system of rational numbers.
MA.6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MA.6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
MA.6.NS.C.7	Understand ordering and absolute value of rational numbers.
MA.6.NS.C.8	Solve real-world and mathematical problems by graphing 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.

MA.6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; 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.
MA.6.NS.C.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
MA.6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MA.6.NS.C.7a	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
MA.6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.
MA.6.NS.C.7c	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
MA.6.NS.C.7d	Distinguish comparisons of absolute value from statements about order.
MA.6.RP	Ratios and Proportional Relationships
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.6.RP.A.2	Understand the concept of a 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.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
MA.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
MA.6.RP.A.3c	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.
MA.6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
MA.6.SP	Statistics and Probability
MA.6.SP.A	Develop understanding of statistical variability.
MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.A.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.



MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:
MA.6.SP.B.5a	Reporting the number of observations.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
MA.6.SP.B.5d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

## **Cross Curricular Standards**

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TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
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## **Grading and Evaluation Guidelines**

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### **GRADING GUIDELINES:**

As per Math Department Policy, grades will be determined by a variety of assessment strategies, including Major Assessments, Minor Assessments, and Performance Assessments. In addition to tests and quizzes, students will be evaluated on a combination of performance assessment instruments including homework completions, cooperative group participation, note-taking, open ended question responses, lab reports and/or supplemental projects.

### **GRADING PROCEDURES:**

Grading procedures must be described in sufficient detail so that a pupil will understand, the minimal to advanced proficiency, expected of him/her as the outcome of each unit, for the marking period and for the course as a whole. Benchmark level assessments associated with the course also need to be identified. While assessments of proficiency levels must be valid and reliable they do not need to be the same for all students.

Other criteria to be considered in grading must be identified and the degree to which such criteria will be considered in a grade. Each pupil must receive a copy of the grading procedures, proficiencies and criteria for each unit and/or marking period.

### **COURSE EVALUATION:**

Course achievement will be evaluated as the percent of all pupils who achieve the minimum level of proficiency (final average grade) in the course. Student achievement levels above minimum proficiency will

also be reported. Final grades, and where relevant mid-term and final exams, will be analyzed by staff for the total cohort and for sub-groups of students to determine course areas requiring greater support or modification.

**In terms of proficiency the East Brunswick grades are as follows:**

<b>A</b>	<b>Excellent</b>	<b>Advanced Proficient</b>
<b>B</b>	<b>Good</b>	<b>Above Average Proficient</b>
<b>C</b>	<b>Fair</b>	<b>Proficient</b>
<b>D</b>	<b>Poor</b>	<b>Minimally Proficient</b>
<b>F</b>	<b>Failing</b>	<b>Partially Proficient</b>

In this course the goal is that a minimum of 95% of the pupils will meet at least the minimum proficiency level (D or better) set for the course. The department will analyze the achievement of students on Unit Assessments, Mid-term and Final Exams and Final Course Grades, and for Final Course Grades the achievement of sub-groups identified by the state to determine if modifications in the curriculum and instructional methods are needed.

**Course evaluation requires the answering of the following questions:**

1. Are course content, instruction and assessments aligned with the required NJSLs?
2. Is instruction sufficient for students to achieve the Standards?
3. Do all students achieve the set proficiencies/benchmarks set for the course?

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**Other Details**

**Mathematics (AAAN)**

**Math Six**

**Course No. 3151**

**SCED**

## 52036 Mathematics (Grade 6)

In grade six, Mathematics (grade 6) course address four main areas: 1) connecting ratio and rate to whole number multiplication and division and use ratio and rate to solve problems; 2) complete the understanding of division of fractions and extend that understanding to negative numbers; 3) write, interpret and use expressions and equations; and 4) develop an understanding of statistics.