

Pre-Algebra (Math 7) Overview - Course 3163

Content Area: **Math**
Course(s): **Pre-Algebra**
Time Period:
Length: **Full Year**
Status: **Published**

Cover Page

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

Superintendent of Schools

Dr. Victor P. Valeski

Mathematics

Pre-Algebra - Course Number: 3163

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Course Adoption: 4/21/1986

Curriculum Adoption: 11/2/17

Date of Last Revision Adoption: 9/1/2017

Course Overview

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 seven, students will begin a more formal study of the skills necessary for success in Algebra and higher level mathematics courses. Students will develop an understanding of and apply proportional relationships. Also, they will further their understanding of operations with rational numbers and work with expressions and linear equations. Students will solve problems involving scale drawings and informal geometric constructions of two dimensional and three dimensional figures. Students will build upon their understanding of statistics to draw inferences about populations based on samples.

Modifications

Newsela.com is available for differentiated reading assignments

The district has a license for [Learning Ally](#). Learning Ally is an audio book resource for students who are unable to “eye read” grade level text but are able to comprehend when “ear reading” or listening.

Materials and Resources

Textbook: Glencoe Pre-Algebra by McGraw-Hill Education (2012).

- Teacher's Resource Package and online resources accompanying text (connectED.mcgraw-hill.com)
- ISBN 13: 9780078957734
- TI-34 Multi-view or TI-30XIIS Scientific Calculator

Content Specific Standards

Grade Seven (Pre-Algebra) Focus:

Instructional time should focus on four critical areas:

- Developing understanding of and applying proportional relationships
- Developing understanding of operations with rational numbers and working with expressions and linear equations
- Solving problems involving scale drawings and informal geometric constructions; working with two- and three-dimensional shapes to solve problems involving area, surface area and volume
- Drawing inferences about populations based on samples

Grade Seven (Pre-Algebra) Overview

Ratios and Proportional Relationships

- Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System

- Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.

Expressions and Equations

- Use properties of operations to generate equivalent expressions.
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Geometry

- Draw, construct and describe geometrical figures and describe the relationship between them.
- Solve real-world and mathematical problems involving angle measure, area, surface area, and volume.

Statistics and Probability

- Use random sampling to draw inferences about a population.
- Draw informal comparative inferences about two populations.
- Investigate chance processes and develop, use and evaluate probability models.

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.7.7

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

MA.7.7.1

Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating

corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

MA.7.7.2

Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

MA.7.7.3

Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

MA.7.7.4

Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

MA.7.G.A.1

Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

MA.7.G.A.2

Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

MA.7.G.A.3

Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

MA.7.G.B.4

Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

MA.7.G.B.5

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

MA.7.G.B.6

Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

MA.7.EE.A.1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

MA.7.EE.A.2

Understand that rewriting an expression in different forms in a problem context

can shed light on the problem and how the quantities in it are related.

MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MA.7.EE.B.4b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.
MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
MA.7.NS.A.1a	Describe situations in which opposite quantities combine to make 0.
MA.7.NS.A.1b	Understand $p + q$ as the number located a distance $ q $ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
MA.7.NS.A.1c	Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
MA.7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
MA.7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
MA.7.NS.A.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
MA.7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
MA.7.NS.A.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
MA.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.7.RP.A.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MA.7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
MA.7.RP.A.2c	Represent proportional relationships by equations.
MA.7.RP.A.2d	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.

MA.7.SP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MA.7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
MA.7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
MA.7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
MA.7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. 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.
MA.7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
MA.7.SP.C.8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
MA.7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
MA.7.SP.C.8c	Design and use a simulation to generate frequencies for compound events.

Interdisciplinary Standards

21st Century Life and Career Ready Practice Standards

2020 New Jersey Student Learning Standards – Career Readiness, Key Skills 9.4 Life Literacies and Key Skills by the End of Grade 9

Creativity and Innovation

Core Ideas	Performance Expectations
h mindset, failure is an important part	• 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use cr

and ideas (e.g., 1.1.12prof.CR3a).

Critical Thinking and Problem-solving

Core Ideas	Performance Expectations
with individuals with diverse an aid in the problem-solving process, or global issues where diverse solutions	<ul style="list-style-type: none"> 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.1). 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance thinking and problem solving (e.g., 1.3E.12profCR3.a). 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice). 9.4.12.CT.4: Participate in online strategy and planning sessions that are school-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

Global and Cultural Awareness

Core Ideas	Performance Expectations
the problems faced by a global society and the contribution of individuals with different backgrounds and experiences.	<ul style="list-style-type: none"> 9.4.12.GCA.1: Collaborate with individuals to analyze a variety of solutions to climate change effects and determine why some solutions (political, economic, cultural) may work better than others (e.g., S.12.HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.7, 7.1.IL.IPERS.7, 8.2.12.ETW.3).

Technology Literacy

Core Ideas	Performance Expectations
digital tools differ in features, capacities, and styles. The use of different digital tools is helpful in determining the best tool for a given task.	<ul style="list-style-type: none"> 9.4.12.TL.1: Assess digital tools based on features such as access options, capacities, and utility for accomplishing a specified task (e.g., 12.6.). 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
digital tools can be used to access different viewpoints and to collect the views of groups of people.	<ul style="list-style-type: none"> 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments. 9.4.12.TL.4: Collaborate in online learning communities or social media virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Pacing Guide

	Time Frame	Marking Period Guide
of Pre-Algebra	3-4 weeks	1
Numbers and Operations	4 weeks	1
and Equations	3-4 weeks	2
Multi-Step Equations and Inequalities	2-3 weeks	2
Proportions	4-5 weeks	2
Rates and Percents	4-5 weeks	3

Relationships and Area of Figures	2 weeks	3
Surface Area and Volume	2 weeks	3
Probability	3-4 weeks	4
Triangles, and Transformations	3-4 weeks	4

Formative and Summative Assessments

Mathematics Department incorporates a variety of methods for assessment including:

Common Unit Test and Quizzes	Minor Assessments & Classwork	Projects	Homework	Midterm Exam
Student assessments based on specific or general content knowledge.	Any cooperative work primarily completed in class, Entrance/ Exit cards, Performance assessments etc.	Some of the courses may utilize content specific projects.	Work assigned to be completed outside of classroom	Common Comprehensive Assessment given after semester 1.

Grading Procedures and Evaluation

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:

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

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?

Other Information

Mathematics (AAAN)

Pre-Algebra

Course No. 3163

SCED

52051 PreAlgebra (Grade 7)

In grade seven, the majority of HMS students take PreAlgebra. Specifically, the PreAlgebra (Mathematics - Grade 7) course addresses four main areas:

- Developing understanding of and applying proportional relationships
- Developing understanding of operations with rational numbers and working with expressions and linear equations
- Solving problems involving scale drawings and informal geometric constructions; working with two- and three-dimensional shapes to solve problems involving area, surface area and volume
- Drawing inferences about populations based on samples