



BOE Approved 8/18

Cliffside Park Public Schools

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COURSE OF STUDY UNIT PLANNING GUIDE FOR:
Pre-Algebra

Grade Level:
9th

Cliffside Park School District
Cliffside Park, NJ 07010
www.cliffsidepark.edu

Revised on August 2018

Course Overview:

Pre-Algebra is an introductory algebra course designed to prepare students for higher level mathematics. Pre-Algebra will review basic math concepts regarding number sense and the rules regarding math operations and the order of implementation. Students will extend their elementary skills and begin to learn algebra concepts that serve as a transition into formal Algebra and Geometry.



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High School Standards listed in conceptual categories:

- ❖ Number and Quantity
- ❖ Algebra
- ❖ Functions
- ❖ Modeling
- ❖ Geometry
- ❖ Statistics and Probability

Overview of Units:

1. Integers, Fractions & Decimals, Exponents, Square Roots, Order of Operations
2. Algebraic Expressions, Solving Equations, Inequalities, Functions, Ratios, Unit Rates & Percents
3. Linear Equations & Slope, Area, Perimeter, Volume, Surface Area, and Pythagorean Theorem
4. More Exponents, Scientific Notation, Polynomials, Probability, and Data Analysis



Unit 4 Pre-Algebra		
Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills
<p>8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology</p> <p>A.APR.A.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.</p> <p>S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p>S.MD.B.6 Use probabilities to make fair decisions (e.g., drawing</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments & critique the reasoning of others.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>	<p>Concept(s)</p> <ul style="list-style-type: none"> 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. Random sampling tends to produce representative samples. <p>Students are able to:</p> <ul style="list-style-type: none"> analyze and distinguish between representative and non-representative samples of a population. <p>Learning Goal : Distinguish between representative and non-representative samples of a population (<i>e.g. if the class had 50% girls and the sample had 10% girls, then that sample was not representative of the population</i>)</p> <p>Concept(s):</p> <ul style="list-style-type: none"> Inferences can be drawn from random sampling. <p>Students are able to:</p> <ul style="list-style-type: none"> analyze data from a sample to draw inferences about the population. generate multiple random samples of the same size.



<p>by lots, using a random number generator).</p>		<ul style="list-style-type: none"> analyze the variation in multiple random samples of the same size. <p>Learning Goal : Use random sampling to produce a representative sample.</p> <p>Learning Goal : Develop inferences about a population using data from a random sample and assess the variation in estimates after generating multiple samples of the same size.</p> <p>Concept(s): No new concepts introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> locate, approximately, the measure of center (mean or median) of a distribution visually assess, given a distribution, the measure of spread (mean absolute deviation or interquartile range). visually compare two numerical data distributions and describe the degree of overlap. measure or approximate the difference between the measures centers and express it as a multiple of a measure of variability. <p>Learning Goal : Visually compare the means of two distributions that have similar variability; express the difference between the centers as a multiple of a measure of variability.</p> <p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p>
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		<ul style="list-style-type: none"> • using measures of center, draw informal inferences about two populations and compare the inferences. • using measures of variability, draw informal inferences about two populations and compare the inferences. <p>Concept(s):</p> <ul style="list-style-type: none"> • Just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space. <p>Students are able to:</p> <ul style="list-style-type: none"> • use organized lists, tables, and tree diagrams to represent sample spaces. • given a description of an event using everyday language, identify the outcomes in a sample space that make up the described event. • design simulations. • use designed simulations to generate frequencies for compound events. <p>Learning Goal : Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams, identifying the outcomes in the sample space which compose the event. Use the sample space to find the probability of a compound event.</p> <p>Learning Goal : Design and use a simulation to generate frequencies for compound events.</p>
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<ul style="list-style-type: none"> ● Homework ● IXL Practice ● Daily Do Now ● Exit Tickets ● Surveys ● Projects ● Teacher made chapter tests ● Quizzes 	<p>Benchmark</p>
<p>Alternative Assessments</p>	
<p>Projects MARS Performance Tasks Modified assignments</p>	
<p>Focus Mathematical Concepts</p>	
<p>Concepts:</p> <ul style="list-style-type: none"> ● Probability and Odds ● The Multiplication Principle ● Stem and Leaf Plots and Histograms ● Box-and-Whisker Plots ● Using Data Displays ● Collecting Data ● Interpreting Data 	<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Representative samples must reflect the entire population. The best way to determine a representative sample is to make sure the sample is randomly chosen. ● Data from random samples can be used to make valid inferences about a population by looking for patterns or trends in the distribution of the data, using measures of center and variation in the data, or by writing a proportion given the number of items in the entire population. ● Data displays, such as box plots, can be used to make informal comparative inferences about two populations. One can compare the shapes of the data displays or the measures of center and



	<p>variability.</p> <ul style="list-style-type: none"> You can use dot plots to compare populations based on measures of center and variability. You can use statistical measures, such as mean and MAD, to make inferences and predictions. A scatter plot is a graph on a coordinate plane that uses points to show the relationship between paired data. These points visually display any clusters, gaps, or outliers. A trend line on a scatter plot approximates the linear association between the paired data. Scatter plots can show a linear or nonlinear association, or no populations.association. Trend lines in linear models can help with making predictions about a set of data. By determining the equation of a linear model, predictions of an outcome can be made. Data can be displayed in a two-way frequency table, making it easier to analyze. Individual data categories can be compared to all the data. Individual data can also be compared to sub-categories to make evidence-based conjectures. Data can be organized in a two-way frequency table and then used to create a two-way relative frequency table. Relative frequency can be determined for the rows and the columns as well as for the whole table
<p>District/School Tasks</p>	<p>District/School Primary and Supplementary Resources</p>
<ul style="list-style-type: none"> Scatter Plot Project 	<ul style="list-style-type: none"> Holt-McDougal Larson Pre-Algebra Text and Online Resources IXL Manipulatives Scientific Calculator
<p>Interdisciplinary Standards</p>	
<p>ELA</p>	



RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

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NJSLSA.W1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

WHST.6-8.1. Write arguments focused on discipline-specific content.

- A. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- B. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
- C. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
- D. Establish and maintain a formal/academic style, approach, and form.
- E. Provide a concluding statement or section that follows from and supports the argument presented.

WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

W.11-12.2.D Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

NJSLS-Technology:



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Students will use Desmos, GeoGebra or the TI-84 calculator to assist in graphing and analyzing these equations. They will discuss their findings with the instructor and their classmates. Students will participate in activities on Google Classroom and other online resources, Desmos, GeoGebra, IXL

8.1.12.A.3 Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

8.1.12.A.4 Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all the worksheets to convey the results.

Career Ready Practices:

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity

21st Century Life and Career:

9.1.12.B.6 Design and utilize a simulated budget to monitor progress of financial needs.

9.1.12.C.2 Compare and compute interest and compound interest and develop an amortization table using business tools.

9.1.12.C.3 Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit.



Integrated Differentiation/Accommodations/Modifications for Pre-Algebra (High School)
(Alternate Modes of Instruction and Support)

Modifications to Support Gifted and Talented Students	Modifications to Support English Language Learners	Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)
<p>Integrate Higher Order Thinking Skills (HOTS) through questioning and extension projects specific to linear equations, inequalities and functions</p> <p>Provide menu of challenge activities for when the child finishes the lesson early (integrate technology when possible).</p> <p>College/Career Readiness skill enhancement - G & T students can research professions related to the Algebra.</p> <p>Have the student teach the lesson - peer tutoring (research-based strategy) Accelerate pace for students who are advanced in concepts.</p> <p>Use inquiry-based, discovery learning approaches that emphasize open-ended problems with multiple solutions or multiple paths to solutions.</p> <p>Allow students to design their own ways to find the answers to complex questions.</p>	<p>Concept/Idea Map - teacher models note-taking on conceptual and concrete mathematics.</p> <p>Contextualize language See each lesson for specific vocabulary</p> <p>Visuals and illustrations to be used for all concrete terms.</p> <p>Word/picture bank available for students' reference in classroom, online and in their textbooks.</p> <p>Wait Time Two - extend basic "Wait Time" - after the 1st student responds to a question, the teacher waits an additional 5 - 7 seconds before calling on another student to ask a question about this unit.</p> <p>Native Language Supports (peer, online assistive technology, translation device, bilingual dictionary) Teach the text backward - frontload the concepts and vocabulary needed for learning the material and activating prior knowledge vocabulary, see specific lesson for vocabulary list.</p> <p>Use a word square to teach target academic vocabulary for this unit.</p>	<p>Review student individual educational plan and/or 504 plan for instructional, assessment, and environmental supports.</p> <p>Allow student to use calculator to solve problems without penalty depending on 504,</p> <p>Teach students how to check the accuracy of the solution that was derived from use of the graphing calculator.</p> <p>Utilize manipulatives and/or visuals within instructional presentation of functions and their changes.</p> <p>Teach students how to check the accuracy of the solution that was derived from use of the calculator or other method.</p> <p>Provide graph paper to aid in aligning calculations and graphing or sketching functions.</p> <p>Provide a table of math facts for reference (unless testing math facts)</p>



<p>Provide some activities that can be done independently or in groups based on student choice.</p> <p>Start the Next Section</p> <p>Individualized Projects by Interest</p>	<p>Support comprehension of unknown vocabulary, by providing examples of Note-taking, highlighting, underlining, etc.</p> <p>Students should be given copies of grade level material or text so they can highlight or underline pertinent information.</p> <p>Provide students with a sample problem or list of steps or procedures for multi-step solutions to problems. Allow student to reference these procedures when solving independently.</p> <p>Modifications For ELL/IEPs/504s/At-Risk Learners: Modifications for Gifted And Talented</p> <p>Translated Notes Shorten assignments to focus on mastery of key concepts</p> <p>Provide visual aids</p> <p>Differentiating the Lesson:</p> <ul style="list-style-type: none"> • Group similar problems together • Provide fewer problems on a worksheet (e.g., 4 to 6 problems per page rather than 20 or 30 but the same total number of problems) • Use enlarged graph paper to help the student keep numbers in columns • Provide a table of math facts for reference (unless 	<ul style="list-style-type: none"> • Tape a number line to student's desk • Read and explain word problems or break problems into smaller steps • Use pictures or graphics • Circle math computation signs • Require the student to solve fewer problems to focus on mastery of concepts <p>Utilize graphic organizer or partially completed template for students to solve word problems and other complex problems in the unit.</p> <p>Provide study guides that are partially completed by teacher, allowing the student to fill in missing information during instruction in order to aid in obtaining information pertaining to modeling linear functions and solving linear systems.</p> <p>Utilize visual aids such as charts or graphs connected to graphing and transformations and provide explicit instruction in how to analyze this data.</p> <p>By utilizing individual student assessment results, the teacher will provide small group or remedial instruction to review essential questions/big ideas, key concepts and provide additional explanations, more examples, and to model procedures in finding the solutions to particular problems.</p> <p>Provide wait time to allow students to process orally unit.</p> <p>Access to word/picture banks to develop an understanding and use content-specific vocabulary.</p>
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	<p>testing math facts)</p> <ul style="list-style-type: none"> • Tape a number line to student’s desk • Read and explain word problems or break problems into smaller steps • Use pictures or graphics • Circle math computation signs • Require the student to solve fewer problems to focus on mastery of concepts <p>IXL Khan Academy in Spanish</p> <p>Give pre-assessments so that students who already know the material do not have to repeat Use multiple resources.</p>	<p>Allow for Student Choice: Students should be permitted to demonstrate understanding of content through illustrations, computer projects, oral response, creative presentations or demonstration, etc.</p> <p>Support comprehension of unknown vocabulary, by providing examples of Note-taking, highlighting, underlining, etc. Students should be allowed given copies of grade level material or text so they can highlight or underline pertinent information.</p> <p>Text to speech/Oral reading if necessary.</p> <p>Provide students with flexible seating options while working independently, depending on need or preference.</p> <p>Math-specific vocabulary and literary terms should be pre-taught before teaching relevant concepts.</p> <p>Allow extra time to complete in class written assignments.</p> <p>Provide students with a sample problem or list of steps or procedures for multi-step solutions to problems. Allow student to reference these procedures when solving independently.</p> <p>Reduce the number of assigned problems within a unit.</p>
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