Unit Calendar 2013-2014
Green Brook Township School District
/ Algebra Concepts Curriculum (D) / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:24AM

Green Brook Township
Public Schools

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Unit:	1 2 3 4	5 6 7 8 9	10 11 12 13	14 15 16	17 18 19 20 21	22 23 24 25	26 27 28	29 30 31 32	33 34 35 36 37	38 39
The Language of Algebra	█									
Equations and Inequalities	█	█								
Fractions and Decimals		█								
Proportional Reasoning			█ █							
Probability and Data Displays				█						
Functions & Graphs / Midterm					█					
Systems of Equations (graphing)					█ █					
Area, Surface Area, and Volume						█				
Lines, Angles, and Transformations							█			
Powers & Roots / NJASK								█ █		
Polynomials and Systems/Final									█ █	
Roller Coaster Project										█

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

Last Updated: Friday, September 21, 2012, 3:40PM

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:24AM

Green Brook Township
Public Schools

Unit: The Language of Algebra (Week 1, 3 Weeks) 📅 🖼️

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 4. Model with mathematics.
- 7. Look for and make use of structure.

CommonCore: Mathematics, CommonCore: Grade 8, The Number System
8.NS Know that there are numbers that are not rational, and approximate them by rational numbers.

- 8.NS.2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Work with radicals and integer exponents.

- 8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Description of Unit	Essential Questions
Students will begin this unit by writing both verbal and algebraic expressions. Students will then learn the Order of Operations and how to use this skill to evaluate expressions. Students will be exposed to the different mathematical properties and why they are so important. Students will focus on the commutative and associative properties, but will also learn about the identity and zero properties. In this unit, students will be exposed to the coordinate plane and will learn how to plot points and how to identify the quadrant in which a particular point is located. The unit will conclude with the students reviewing the integer rules.	- Why is it important to have a systematic approach to mathematical problems? - How can we use counting chips to model mathematical expressions? - Why is it imperative to have a strong foundation in basic mathematical operations? - Why do we have a structured way to label points on a coordinate plane?

Knowledge	Skills
Students will know that: • the order of completing the operations in an expression is: parenthesis, exponents, multiplication, division, addition, and subtraction (PEMDAS). • the Commutative Property applies to addition and multiplication expressions and states that the order in which the numerals are written can be changed without affecting the solution. • the Associative Property applies to addition and multiplication expressions and states that the grouping of the numbers can be changed without affecting the solution. • the Distributive Property states that the number outside of the parenthesis is used to multiply every term inside the parenthesis. • the Identity Property applies to multiplication and addition and states that adding 0 or multiplying by 1 does not change the "identity" of the number. • the Zero Property of Multiplication states that any number multiplied by zero is equal to zero. • to plot a point on a coordinate plane, one must "walk before one climbs". • the integer rule for adding integers is that if the signs are the same, add the integers then choose the common sign. If the signs are different, then subtract and choose the sign of the number with the largest absolute value. • the integer rule for subtracting integers is SAME CHANGE CHANGE, then follow the same rules for addition. • the integer rules for multiplication and division are that if the numbers have the same sign, the answer is positive. If the numbers have different signs, the answer is negative.	Students will be able to: • apply their knowledge of key mathematical words to translate phrases into mathematical statements (and vice-versa). • devise problems in which they demonstrate knowledge of the mathematical properties. • apply integer skill knowledge to evaluate expressions. • discover and apply a systematic approach to evaluating expressions (order of operations). • plot points on a coordinate grid and identify the quadrant in which the point is located. • add, subtract, multiply, and divide both positive and negative numbers. • identify "key" mathematical words to assist in translating expressions. • raise a number to a power and solve. • identify the mathematical properties: associative, commutative, distributive, identity, and zero properties

Assessments

Algebra Concepts Pre-test
Diagnostic: Benchmark Assessment
   Students will take this pre-test to provide data for instruction.

Do Now exercises
Formative: Instructional/Assessment Focus
   Daily assessments will be used to check for prior knowledge and to determine mastery of particular topics.

Mid Unit Quiz
Formative: Written Test
   This mid-unit quiz will assess skills and knowledge learned in the first portion of this unit.

Communicators
Formative: Other written assessments
   Communicators wil be utilized to check for total class comprehension of portions of the unit.

Integer "saying" activity
Formative: Other visual assessments
   This activity assesses concepts associated with integer rules.

Unit Test
Summative: Written Test
   This assessment will address all concepts from "The Language of Algebra" unit.

Activities	Activities to Differentiate Instruction
- Student-centered Smartboard lessons - Create posters of common mathematical "key words" - Integer "saying" activity - Textbook scavenger hunt - Smart pal review games	- Cooperative learning with heterogeneous grouping - Tiered questioning for basic, average, and advanced students - The use of counting chips to assist those struggling with the integer rules - Human number line to assist with ordering integers - Completed study guides - Provide decimal operations to those students who've shown mastery with integers - Stations to provide opportunities for cooperative learning - Smartboard lessons to provide support for visual and kinisthetic learners - Study groups to provide small group instruction
Integrated/Cross-Disciplinary Instruction	**Resources**

- **ELA:** Practice formulating complete and grammatically correct responses to open-ended questions.
- **Math/Economics:** Apply the concept of "integer rules" to making money and having a bank account.
- **Science/Social Studies:** Relate integer operations to the change in elevation and or temperature.

Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook
Spectrum Math (Grade 8)
Pre-Algebra textbook and workbook
Chapter 1 teacher resource book
Punchline/Pizzazz worksheets (self correcting)
Smartboard Lessons
Kuta generated worksheets
Glencoe Mathematics online tutorial and practice tests

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:25AM

Green Brook Township
Public Schools

Unit: Equations and Inequalities (Week 4, 3 Weeks) 🗓 🖼

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.7. Solve linear equations in one variable.
- 8.EE.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
- 8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Description of Unit	Essential Questions
Students will begin this unit by simplifying expressions by combining like terms. Students will also be responsible for utilizing the distributive property, then simplifying the remaining expression. From there, students will be exposed to equations. Students will do everything from solving one-step equations to solving multi-step equations. Students will also be exposed to the "special cases" of no solution and all real numbers. Once students are comfortable with solving equations, students will learn how to set up an equation based	- How can we relate the integer rules to the process of solving linear equations? - Why is it important to follow specific steps to arrive at a solution to an equation? - How can we determine by looking at an equation that there is no solution? Infinite solutions? - How can terms in an expression be considered like terms, but in an equation using those same terms we can't combine them?

upon a word problem. Students will then apply this concept of equations to solving "real world" examples. Lastly, students will learn how to solve an inequality and graph its solution on a number line.

Knowledge	Skills
Students will know that: - like terms must have the same variable raised to the same power. - when using the distributive property, one must multiply that number to everything in the parentheses. - in order to solve equations, one must use inverse (opposite) operations. - there are 5 steps to solve multi-step equations: utilize the distributive property if necessary, combine like terms, get the variable on one side of the equation, get the constant on one side of the equation, and multiply or divide to get the variable by itself. - solving inequalities is similar to solving equations. - you must flip the inequality symbol when dividing or multiplying both sides of the inequality by a negative number.	Students will be able to: - simplify expressions by combining like terms (including using the distributive property) - write expressions for the area and perimeter of figures by combining like terms - solve all types of linear equations by utilizing inverse operations (including multi-step equations). - apply their knowledge of the order of operations and check their solution to a linear equation. - solve and identify when an equation has no solutions or an infinite number of solutions. - solve and graph inequalities on a number line.

Assessments

Do Now Exercises
Instructional/Assessment Focus
   The Do Now's in this chapter will focus on "re-teaching" and reinforcing prior knowledge.

Mid-Unit Quiz
Formative: Written Test
   This mid-unit quiz will focus on strictly solving linear equations. Students will also be required to determine when linear equations have no solution or infinite solutions.

5 Step Rules for Solving Equations Poster
Formative: Personal Project

The purpose of making this creative poster is for students to follow a structured approach for solving equations. These posters will then be hung around the room to serve as a reminder for solving equations throughout the year. There will also be posters created reminding students how to distinguish between no solution/all real numbers when solving linear equations.

Match Game for Inequalities
Formative: Other written assessments
In this review game, students will match inequality problems to their answer and the corresponding graph.

Unit Test (Equations/Inequalities)
Summative: Written Test
This unit test will tie together all student knowledge from solving multi-step linear equations and inequalities.

Activities	Activities to Differentiate Instruction
- Student centered Smartboard presentations - Creating classroom posters for the 5 steps to solving a linear equation (including examples) - Posters showing how an equation can have no solution or infinitely many solutions - Smart pal review sessions - Match game for solving and graphing inequalities (taken from activity generator)	- Online: balancing equations activity (using a triple balance) - Algebra Tiles to assist the kinesthetic and visual learners to solve equations - Cooperative learning with heterogeneous grouping - Premade number lines for graphing inequalities "Character" to assist students with the inequality symbols. Students must put the variable <u>before</u> their character. - Tiered questioning for basic, average, and advanced students - Smartboard presentations to provide a hands on approach to solving linear equations - Completed study guides - Small group sessions to promote one on one instruction - Equation worksheets involving decimals to give a challenge to those who're succeeding with integer operations. - Apply the concept of area and perimeter to simplifying expressions
Integrated/Cross-Disciplinary Instruction	**Resources**
	<u>Glencoe Mathematics: Algebra Concepts and Applications-</u> textbook and workbook

• **Economics:** show students the concept of equations in the form of word problems. Present varying types of questions in which students must figure out how much money they would have after a given period of time.	Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Chapter 2 teacher resource book Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets for solving equations and inequalities Online "scale balance" helping visualize for the students that equations need to be balanced at all times Match Game cards for inequalities

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:25AM

Green Brook Township Public Schools

Unit: Fractions and Decimals (Week 7, 3 Weeks) 🀰 🖼

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, The Number System
8.NS Know that there are numbers that are not rational, and approximate them by rational numbers.

- 8.NS.1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.7. Solve linear equations in one variable.
- 8.EE.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
- 8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Description of Unit	Essential Questions
Students will begin this chapter by comparing and ordering decimals. From there, students will review how to perform mathematical operations involving decimals. Students then will begin reviewing fraction operations. Students will practice adding, subtracting, multiplying, and dividing	- How can we apply our rules of equations to equations that have decimal or fraction coefficients? - How can we use math to create shortcuts for solving equations?

fractions. Fractions and decimals will then be combined, as students review how to convert between fractions and decimals. Throughout the course of the unit, students will be solving "real world" problems involving fractions and decimals. Lastly, students will solve equations involving decimals and fractions.

- Why is it important to be able to convert from fractions to decimals and vice a versa?

Knowledge	Skills
Students will know that: - you need to have a common denominator when adding or subtracting fractions. - you can cross simplify when multiplying fractions. - you need to utilize "same change reciprocal" for dividing fractions. - fractions can be written as decimals and decimals can be written as fractions. - in order to compare and order decimals one must line up their decimal points and add zeros as place holders. - they can make fractions in an equation "disappear" by multiplying every term in the equation by the least common denominator. - they can make decimals in an equation disappear by simply moving the decimal point the same number of places in each term.	Students will be able to: - compare and order both decimals and fractions. - evaluate expressions involving fractions or decimals. - convert between fractions and decimals. - solve linear equations involving fractions and decimals. - utilize the method of making fractions and decimals "disappear" to create simpler equations to solve.

Assessments

Do Now Exercises
Instructional/Assessment Focus
   The do now's purpose is to "re-teach" and reinforce various concepts discussed in this unit related to fractions and decimals.

Mid-Unit Quiz (fractions and decimals)
Formative: Written Test
   The purpose of this mid-unit quiz is to tie together the concepts of evaluating expressions involving fractions and decimals. In this quiz, students will also be comparing and ordering decimals and fractions.

Decimal Project
Formative: Personal Project

In this project, students will be given a ShopRite circular and told they must buy food to have a Thanksgiving dinner at their house. Students will be required to stay within their budget, and answer "real world" questions pertaining to the project.

Fractions Foldable
Self Assessment
The purpose of this foldable is for students to recall the steps to add, subtract, multiply, and divide fractions. These foladables will also serve as a study tool for the unit test.

Unit Test
Summative: Written Test
This test will tie together everything discussed within the decimals/fractions unit. This will also tie back to the last unit with solving equations. Students will solve all types of rational equations in this unit test.

Activities	Activities to Differentiate Instruction
- Student centered Smartboard presentations - Teacher-created stations to review basic decimal and fraction operations **Decimal Project:** teacher-created project in which students are provided with a ShopRite circular and required to purchase items to make a Thanksgiving Dinner. Students will be required to solve "real world" questions based on the project. - Smart pal review games - Group work to create posters to remind students of the steps for adding, subtracting, multiplying, and dividing fractions	- Utilize mnemonic phrases to help change fractions to decimals (drop the top) - Interactive Smartboard presentations that provide "hands on" learning - Provide one-on-one instruction for students struggling with concepts - Completed study guides - Calculators (to assist when adding multiple decimals together) - Create foldables that provide a visual/step by step guide to fraction operations - Human number line to assist students ordering fractions and decimals - Group work with the students "study buddy"
Integrated/Cross-Disciplinary Instruction	**Resources**
Math/Economics: Relate decimals to prices of food items. Students must be able to budget their money wisely to have enough money for all required items. **Science:** Apply fractions and decimals to the rate of growth of trees in a forest.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets for fractions and decimals

Calculators
ShopRite Circulars for the decimal project
Poster paper to remind students of the steps for
fraction/decimal operations

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Unit Map 2013-2014
Green Brook Township School District
/ *Algebra Concepts Curriculum (D)* / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:25AM

Unit: Proportional Reasoning (Week 10, 4 Weeks)

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 6. Attend to precision.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, The Number System
8.NS Know that there are numbers that are not rational, and approximate them by rational numbers.

- 8.NS.1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.7. Solve linear equations in one variable.

Description of Unit	Essential Questions
To begin this unit, students will determine whether two ratios are a proportion. This will lead into students solving proportions (including using the distributive property.) Students will apply their knowledge of proportions to "real life" situations. Next, students will use proportions to compute the actual size of scale drawings. After learning how to solve and apply proportions to the real world, students will learn about the percent proportion. This will lead to the discussion of "percent of change". Lastly, students will learn about	• How can our knowledge of equations assist us in solving proportions? • In what jobs or professions is it imperative to have a strong foundation in proportional reasoning? • In what ways do we encounter percentages in our everyday lives?

percent applications and how to apply this to the real world.
Topics of discussion for percent applications will be:
tax, markup, and discounts.

Knowledge	Skills
Students will know that: • the true definition for a proportion is "equal ratios". • there are two ways to solve proportions (arrow method and cross products). • proportions can be used to create scale models. • percentages represent a part of the whole and are always out of 100. • you can set up a proportion and use percentages to find the tax or discount while you are shopping. • there are many practical uses involving percentages.	Students will be able to: • solve proportions by either using the arrow method or cross multiplying. This also includes proportions in which one must utilize the distributive property. • solve proportion word problems related to real world examples. • apply the principle of proportions to scale drawings. • apply their principle knowledge of proportions in order to determine a systematic approach to finding the percent of change for a given situation. • recall their newly-acquired knowledge of "percent of change" and apply it to percent applications.

Assessments

Do Now Exercise
Instructional/Assessment Focus
   These Do Now's will serve as a review of the focus of the previous day's lesson to ensure complete comprehension.

Unit Rate Activity
Formative: Other visual assessments
   Students will find their resting and active heart rate and then calculate their unit heart rate. As an extension, students will find the percent of change from their resting heart rate to their active heart rate.

Road Trip Activity
Formative: Other written assessments
   This activity will combine the students' knowledge of proportions and scale drawings and allow them to apply it to a practical situation.

Mid-Unit Quiz (proportions)
Formative: Written Test
   This mid-unit quiz will encompass everything the students have learned about proportions and scale drawings.

Shopping Activity

Formative: Other visual assessments

This activity wil involve students finding the discount amount and the new price for various items found in stores. Students will work as a team to find the best deal.

My Wish List
Formative: Other written assessments

This activty will encompass all of the concepts dealing with percents and percent applications. Students will select 3 items to purchase then find the shipping amount and tax for their purchase.

Unit Test (percents and proportions)
Summative: Written Test

This test will assess everything the students have learned about proportions and percents.

Hot Wheels Activity
Formative: Personal Project

This project will apply the idea of proportions to scale models and car design. Hot Wheels designs its cars proportionally to the actual vehicle.

Activities	Activities to Differentiate Instruction
Road Trip Activity: teacher-generated project in which students plan a trip across the United States. Utilizing their knowledge of proportions and scale drawings, they calculate exactly how far they've traveled. At the end of the project, students will be required to answer application questions related to their trip. **My Wish List:** teacher-generated activity in which students will be given a wish list of items to buy. Students will be permitted to purchase any 3 of the items listed. They will then calculate the tax and the shipping cost based on their balance. **Unit Heart Rate Activity:** students will find their heart rate for 30 seconds. Students will then be taken outside for exercise. Students will then find their active heart rate for 30 seconds. Students will calculate the unit rate for their resting and active heart rates. - Student centered Smartboard presentations - Smart pal review games - Percent Proportion/Application stations	- Shopping activity: students will be given 10 index cards with prices from 4 different stores. Students will then work as a team to determine which store is offering the item at the best price. These cards will be leveled A-D based on ability. Students will then be told by the teacher which letter to complete. (taken from activity generator) - MINCH activity, which will assist students in measuring using a ruler - Group activity in which students will come up with their own real-world problem involving proportions. Students will then go to the different groups and solve each group's problem - Completed study guides - Heterogeneous grouping for projects and group assignments - Calculator use to assist with larger numbers - Hot Wheels activity in which students find the dimensions of a Hot Wheels car and that information, they calculate the actual dimensions of the real car. Students will be

permitted to use a calculator for this activity.
(taken from Middle School Math magazine)

Integrated/Cross-Disciplinary Instruction	Resources
Math/Economics: relating percentages to shopping and going to stores to find the best deal **Science:** applying the concept of unit rate to resting and active heart rates **Architecture:** applying the concept of proportions to scale drawings and models **Car Design:** students will take the dimensions from a Hot Wheels car and apply it to the dimensions of the actual car it replicates **Physical Education:** students will run and exercise to check their active heart rate	<u>Glencoe Mathematics: Algebra Concepts and Applications-</u> textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets for percents and percent applications "My Wish List" resource activity M.S. Math activity generator (shopping activity) Road Trip Activity directions

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Unit Map 2013-2014
Green Brook Township School District
/ *Algebra Concepts Curriculum (D)* / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:27AM

Unit: Probability and Data Displays (Week 14, 3 Weeks) 📅 📊

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 4. Model with mathematics.

CommonCore: Mathematics, CommonCore: Grade 8, Statistics & Probability
8.SP Investigate patterns of association in bivariate data.

- 8.SP.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- 8.SP.2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Description of Unit	Essential Questions
In this unit, the first topic of study is probability. Students will learn the difference between theoretical and experimental probability. Students will apply this knowledge to finding the probabilities of compound events. The second portion of the unit will include a review of data analysis. This will include various methods of interpreting and displaying data. Students will learn how to construct and interpret the meaning behind a box and whiskers plot. They will also interpret circle graphs. Students will construct their own circle graphs based on the data they collect from their surveys. Lastly, students will be able to create and analyze scatterplots and find the line of best fit.	- How can we apply our knowledge of fractions and proportions and apply them to probability? - In what types of jobs is it imperative to be able to read and interpret graphs? - What types surveying techniques make a survey fair and unbiased? - How are we able to draw conclusions by looking at a scatterplot diagram?

Knowledge	Skills
Students will know that: • to find the probability of a simple event, the number of possible outcomes is displayed in the numerator and the total number of outcomes is displayed in the denominator. • when finding the probability of the occurrence of an event, one can represent it as a ratio, percent, or decimal. • when finding the probability of independent events, one must multiply each individual probability together. • when finding the probability of dependent events, one must subtract one from the denominator and sometimes the numerator as well, before multiplying both probabilities together. • in order to conduct a fair survey, one needs to have good surveying techniques and be free from bias in the types of people that are surveyed. • to find the degree in a circle graph, one must set up a proportion (part over whole is equal to percent over 100). • the line of best fit is used to determine if there is a correlation between data sets	Students will be able to: • compute the probability of both simple and compound events. • differentiate between experimental and theoretical probabilities. • compute both the experimental and theoretical probability of an event occurring. • interpret various data displays and understand the meaning of box and whisker plots and Venn Diagrams. • create and interpret their own circle graphs • survey their classmates about a particular topic, without bias • create and interpret a scatterplot and devise the line of best fit.

Assessments

Do Now's
Instructional/Assessment Focus
  These "Do Now's" will serve as a tool to check for student comprehension of skills and concepts.

M-A-T-H Activity
Formative: Self Assessment
  This activity will check for student comprehension when distinguishing between experimental and theoretical probabilities. This provides a hands-on approach for differentiating between the two types of probability.

M&M's Activity
Formative: Other written assessments
  This assessment combines the singular and compound probabilities in a "hands on" environment. This will also review the skill of converting fractions, decimals, and percentages.

Probability Quiz
Formative: Written Test

This quiz will assess all of the key components from the first half of the probability unit.

Survey Project
Formative: Personal Project
This survey project provides an in depth look at surveying techniques and configuring the results of the survey through varying data displays. Students will answer teacher-generated questions based on the results of their surveys.

Probability Unit Test
Summative: Written Test
This test will include an assessment all of the students knowledge from the probability and data displays unit.

Activities	Activities to Differentiate Instruction
• **MATH Activity:** students are given a sheet of paper with the letters M-A-T-H on it. Students cut out the letters and organize them on their desk. Students will be exposed to the differences between experimental and theoretical probabilities. As an extension, tie in the idea of compound probability with this activity. • **M&M's Activity:** teacher-generated activity in which students are given M&M's and asked to complete a variety of questions based on the probability that a particular one of their M&M's is chosen at random. This will also review with the students how to set up and solve proportions. • **Birthdays Lesson:** students will learn how to create and interpret a box and whisker chart based on the birthdays of their fellow classmates. • **Survey Project:** teacher-generated project in which the students will conduct their own survey and create 2 types of data displays to present their data.	• By flipping a red and yellow counting chip 20 times, students will be able to differentiate the difference between experimental probability and theoretical probability. • Have students come up with their own examples in which they can create a tree diagram to find the number of possible outcomes. • Interactive Smartboard presentations that allow students to roll a die and flip a coin. Students can apply their knowledge of theoretical and experiments probabilities to this activity. • Open-ended activity in which students learn how to formulate a 3-point response to an open-ended question. Students will be walked step by step through exactly what is needed to generate a 3-point response. • Heterogeneous grouping for classwork and group assignments • "Group Meetings" in the back of the room to provide additional one-on-one instruction • Smart pal review sessions
Integrated/Cross-Disciplinary Instruction	**Resources**
• **Meteorology:** relating probability to the concept of predicting weather.	Glencoe Mathematics: Algebra Concepts and Applications-textbook and workbook Spectrum Math (Grade 8)

• Students will see if their results for the M&M's activity mirror what the *MARS* corporation states when packaging their M&M's. • Student areas of interest: students will devise survey questions based on topics that are pertinent to their lives.	Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Counting chips to assist the kinesthetic and visual learners M & M's activity worksheet M-A-T-H cutout worksheet Survey project directions and circle template

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Last Updated: Tuesday, September 4, 2012, 8:25PM

Atlas Version 7.2.6

Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:28AM

Unit: Functions & Graphs / Midterm (Week 17, 3 Weeks) 🖩 📑

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Understand the connections between proportional relationships, lines, and linear equations.

- 8.EE.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
- 8.EE.6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.8. Analyze and solve pairs of simultaneous linear equations.

CommonCore: Mathematics, CommonCore: Grade 8, Functions
8.F Define, evaluate, and compare functions.

- 8.F.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

- 8.F.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
- 8.F.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

8.F Use functions to model relationships between quantities.

- 8.F.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- 8.F.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Description of Unit	Essential Questions
This unit begins with students learning the meaning of domain, range, and relations. Students begin graphing equations by learning how to put an equation in slope intercept form ($y = mx + b$). Students then learn to create a table to find ordered pairs so they can graph an equation (method 1). Next, students will learn about x/y intercepts and how to use them to graph an equation (method 2). Next, students will be introduced to slope and will learn how to find the slope of the line on a graph and when given two points. Lastly, students will be learn to graph a line simply by knowing the slope and the y intercept (method 3).	- How can change be represented mathematically? - How can patterns, relations, and functions be used as tools to best describe and explain real-world situations? - How are patterns of change related to the behavior of functions?

Knowledge	Skills
Students will know that: - the domain refers to the input of a function. - the range refers to the output of a function. - a function means there is one and only one output for every input. - a linear equation will produce a straight line when graphed.	Students will be able to: - identify the domain, range, and whether or not a relation represents a function. - evaluate expressions by plugging in values for the input (x value). - utilize the steps for solving equations and apply the process to placing an equation in slope intercept form. - create an x/y table in order to graph a linear equation.

- in order to create an x/y table, one must evaluate an expression by inserting the input (x value) into the expression.
- putting an equation in slope intercept form means to solve for y.
- to graph an equation by finding the x and y intercepts, one plugs zero in for x and y then solves.
- to find the slope of a line, one completes "rise over run".
- the variable "m" represents the slope and the variable "b" represents the y intercept in an equation
- one should always "begin" at the y intercept and "move" in the direction the slope indicates.

- solve to find out the x and y intercepts of an equation and graph the equation.
- discover the slope of a line when given a graph or two ordered pairs.
- graph a line by identifying the slope and y intercept of a line.
- apply the concept of slope to real world situations.

Assessments

Do Now Exercises
Instructional/Assessment Focus
   The purpose of these assessments is to evaluate, and re-teach when necessary, the concepts of graphing equations.

Slope Drawing Activity
Formative: Personal Project
   This activity will assess whether the students are able to find the slope of a line when given a graph. As an extension, students can trade papers with a partner and utilize the formula for finding the slope when given two points.

Functions Quiz
Formative: Written Test
   This quiz will include all of the concepts from the first half of the chapter, functions to slope intercept form.

Midterm Exam
Benchmark Assessment
   Assessment for all of the concepts learned during the first half of the year.

Real World Functions Activity
Formative: Other written assessments
   Students will determine if there is a relationship between the heights and foot length of their classmates.

Functions Unit Test
Summative: Written Test
   An assessment of all of the concepts and skills learned in the functions unit.

Activities	Activities to Differentiate Instruction
- Interactive Smartboard presentations giving students a hands-on approach to finding the slope of a given line. **Slope drawing activity:** teacher-generated activity in which students create a picture of their own utilizing straight lines. They must then go back and find the slope of all the lines that make their picture. As a challenge, have students go back and utilize the formula for finding the slope when given two points. **Function activity:** teacher-generated activity in which the students discover whether there is a relationship between a person's height and shoe size. Students will measure the height and feet of their classmates. Ten students will then be selected to share their height and the length of their foot. The class will graph these points and determine whether or not there is a relationship. - Smart pal review sessions to combine skills learned within the functions unit.	- Give students their own sheet of graph paper and different colored pencils that will be used to show the rise and the run on a graph. Associate the rise with a particular color and the run with another color. - Connect the term "intercepts" with the idea of interceptions in football. Have students watch a video of great interceptions and explain to the students that an intercept is similar because it's the spot where the line "intercepts" or crosses one of the axes. - Activity generator activity in which students try to make their own connection of slope and y intercept to the equation y = mx + b. - Provide calculators to assist with basic calculations. - Provide a completed study guide. - Group meetings in the back of the room to assist with the basics especially: putting equations in slope intercept form, plotting points on the coordinate grid; and graphing equations by finding the slope and y intercept.

Integrated/Cross-Disciplinary Instruction	Resources
Science: comparing the height and foot length of students to determine whether or not there is a relationship. **Science:** comparison between the high and low temperature on a specific day in Green Brook to determine whether it represents a function.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing with graphing linear equations by utilizing one of the three methods. Slope drawing activity worksheet Function activity directions worksheet Graph paper (both numbered and un-numbered) Activity generator for discovering a relationship between an equation and a lines slope and y intercept.

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Unit Map 2013-2014
Green Brook Township School District
/ *Algebra Concepts Curriculum (D)* / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:28AM

Unit: Systems of Equations (graphing) (Week 20, 3 Weeks) 🈷 📑

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.8a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- 8.EE.8b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
- 8.EE.8c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

CommonCore: Mathematics, CommonCore: Grade 8, Functions
8.F Define, evaluate, and compare functions.

- 8.F.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

8.F Use functions to model relationships between quantities.

- 8.F.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Description of Unit	Essential Questions
In this unit, students will apply their knowledge of slope to families of linear graphs (parallel and perpendicular lines). Students also will apply their knowledge of slope intercept form to determine the equation of a line and will learn to write equations for parallel and perpendicular lines. In addition, students will learn how to solve linear word problems (involving slope and a y intercept). Finally, students will learn how to solve a system of equations by graphing.	• Why is it important to have a strong foundational understanding of the concepts of slope and y intercept? • How can we take knowledge of parallel and perpendicular lines and apply it to a linear equation? • How can we apply the concept of "systems of equations" to real-world situations?

Knowledge	Skills
Students will know that: • there are three ways to write an equation of a line: given a line, given the slope and y intercept, and given two ordered pairs. • the slope of a line is what is constantly changing in the problem and the y intercept is where we begin the problem. • parallel lines have the same slope, but a different y intercept • perpendicular lines have negative reciprocal slopes and different y intercepts. • the solution to a system of equations is where the lines intersect one another. • in order to check the solution to a system of equations one must plug the answer back into both original equations. • a system of equations can have no solution (pair of parallel lines), or all points on the line (when both equations are the same).	Students will be able to: • write the equation of a line when given a graph, slope/y intercept, and two ordered pairs. • write equations of lines that are parallel and perpendicular to the original equation. • identify the slope and y intercept in a given word problem, and use this information to solve the problem. • solve a system of equations by graphing. • apply their knowledge of evaluating expressions to checking the solution to a system of equations. • identify special cases when a system of equations has no solution or multiple solutions.

Assessments

Do Now Exercises
Suggested Instructional/Assessment Strategies
   These do now exercises will assess all previously learned knowledge and serve as a "re-teaching" strategy as well.

Walkathon Activity
Formative: Other written assessments
   This activity will focus on students' ability to identify the slope and y intercept in a real-world situation. This is a stepping stone to the ultimate goal of solving systems of equations word problems.

Linear Equations Project
Formative: Personal Project
   This project will encompass all learning on linear equation word problems.

Linear Equations Unit Quiz
Formative: Written Test
   This quiz will assess all skills from the first half of the unit (parallel and perpendicular lines to solving linear equation word problems).

Smart Pals
Formative: Suggested Instructional/Assessment Strategies
   The smart pals will be used frequently as a quick whole class assessment tool to check for understanding of concepts and mastery of skills.

Amusement Park Activity
Formative: Self Assessment
   This assessment will require students to apply their knowledge of linear equations to a system of equations. Students will solve a real-world problem in which they set up a system of equations to model the situation represented.

Systems of Equations Unit Test
Summative: Written Test
   This unit test will include all unit skills relative to equations of lines and solving a system of equations by graphing.

Activities	Activities to Differentiate Instruction
• **Walkathon Activity:** (From the Connected Mathematics series) students will complete a word problem involving money earned for a walkathon and graph the results. This will expose students to the concept of slope and y intercept in a word problem. It also serves as an introduction for students to discover at what point the walkers will earn the same amount of money after a given time (system of equations). • Linear Equations Project: in this teacher-generated activity students will work in groups of three to design their own word problem that can be solved utilizing a	• **Linear Equations Project:** work with groups that are struggling with the concept of linear equations and model a few examples of possible word problems to use. Review the basics such as graphing a line and how to identify the slope and y intercept in a word problems. • **Amusement Park Activity:** a teacher-generated activity in which students apply their knowledge of linear equation word problems to a system of equations. Students will be responsible for finding the best ticket offer when going to an amusement park by solving a system of equations by graphing.

linear equation. Students will create a poster representing their problem and will solve the problems created by each group.
- Interactive smartboard presentations in which students will graph the equations to see where the lines cross.
- Smart pal review games that encompass all concepts from the system of equations unit.

- Provide calculators to assist with basic calculations.
- Provide a completed study guide.
- Provide students with a step-by-step guide to graphing equations, and helpful hints recalling when lines are parallel or perpendicular to one another.
- Heterogeneous grouping to provide peer to peer interaction.

Integrated/Cross-Disciplinary Instruction	Resources
Science: apply the concept of slope to the rate of snowfall. **School Activity/Fundraiser:** come up with a graph representing trends in a school's fundraising effort. **Economics:** apply the concept of system of equations to finding the best deal at an amusement park or cell phone plan.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook *Connected Mathematics Series* dealing with linear equations Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing with solving a system of equations by graphing Graph paper (both numbered and un-numbered) Walkathon Activity directions and graph paper Amusement Park activity directions Linear Equations Project and poster paper

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:29AM

Unit: Area, Surface Area, and Volume (Week 23, 3 Weeks) 🖩 🖼

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 5. Use appropriate tools strategically.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.7. Solve linear equations in one variable.
- 8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

CommonCore: Mathematics, CommonCore: Grade 8, Geometry
8.G Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

- 8.G.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Description of Unit	Essential Questions
Students will begin this chapter by reviewing the classification of triangles by their sides and angles. Students will learn to use algebra to find the missing angle measurement of a triangle. Students will then learn about quadrilaterals. Students will also identify quadrilaterals and find missing angle measures. Students will then learn how to calculate the area and perimeter	- In what jobs will you use the concepts of geometry, and how will you use them? - How are we able to build upon our previously-acquired knowledge of equations and apply it to geometry?

of a variety of shapes (including circles) and of irregular figures. To conclude the unit, students will be introduced to solid figures, and they will learn how to find the surface area and the volume of a variety of solid figures.

- In what practical ways is it important to know the surface area or volume of a solid?

Knowledge	Skills
Students will know that: - triangles can be classified by their sides (isosceles, scalene, or equilateral), or by their angles (acute, obtuse, or right). - all angles in a triangle add up to 180 degrees. - there are many types of quadrilaterals (parallelogram, trapezoid, rhombus, rectangle, and square). - all angles in a quadrilateral add up to 360 degrees. - in order to find the missing angle in a triangle or quadrilateral, it's imperative to set up and solve an equation. - there are formulas to find the area of parallelograms, trapezoids, squares, circles, and rectangles. - in order to find the area of irregular figures, one must break the figures up into regular shapes for which one can calculate the area. - solids are 3-D representations of figures. Solids are classified by their bases. - in order to find the surface area and volume of solids one must utilize specific formulas.	Students will be able to: - classify a triangle by its sides or angles. - classify a quadrilateral based on the given information about the shape. - evaluate missing sides and angles in triangles and quadrilaterals by setting up and solving equations. - compute the areas of parallelograms, trapezoids, rectangles, squares, and circles - simplify the area of an irregular figure by breaking the figure down into shapes for which one can calculate the area. - classify a solid based on its base(s). - compute the surface area and volume of varying solids.

Assessments

Do Now Exercises
Instructional/Assessment Focus
   The do now exercises will assess, and re-teach when necessary, the concepts discussed in class.

Figure Drawing Activity
Formative: Self Assessment
   Students will be assessed on their ability to follow directions and to identify a trapezoid or rhombus.

Breaking Down Irregular Figures

Formative: Other written assessments
   This hands-on activity will assess students' ability to to find the area of an irregular figure.

Unit Quiz Angles, Area, and Classificaiton
Formative: Written Test
   This quiz will assess all of the concepts from the first half of the unit, including: finding the missing angle in triangles/quadrilaterals, shape classification, and finding the perimeter and area of 2-D shapes.

Playground Activity
Formative: Other written assessments
   This activity will assess the concepts of surface area and volume and will require students to calculate how much material is needed to create a playground.

Smart Pal Reviews
Formative: Suggested Instructional/Assessment Strategies
   These smart pal reviews will provide a quick whole class assessment.

Area, Surface Area, and Volume Unit Test
Summative: Written Test
   This test will include all of the concepts and skills learned within the unit.

Activities	Activities to Differentiate Instruction
• **Shape Drawing Activity: (**activity generator) students give directions to reproduce the picture that they are looking at by utilizing terms learned in the unit. • **Playground activity:** (Pre-Algebra book) students produce an imaginary playground and determine how much material is needed to build it based upon specific calculations. • **Rectangular Net Activity:** teacher-generated activity in which students are introduced to the concept of surface area. Students use interconnecting blocks to create a rectangular prism. They trace out the net of this prism on a sheet of paper and find the area of each side. Students will attempt to discover a pattern, which will lead them to the formula for the surface area of rectangular prisms.	• **Filling Solids:** teacher-generated activity in which students predict how many cones of water it will take to fill up a cylinder that has the same height and base. Students will discover that it takes exactly three cones to fill up one cylinder. This will help students understand where the 1/3 comes from in the formula for volume of a cone. Perform this experiment again with a rectangular pyramid and prism. • **Breaking Down Irregular Figures:** teacher-generated activity in which students will be given 3 different shapes and will be asked to put them together to form an irregular figure. Students will trace their irregular shape on a piece of construction paper. Students will determine that in order to find the area of this figure they need to break it down to the simpler three shapes that were originally given to them.

- Interactive Smartboard presentations in which students can classify shapes and solids by dragging them into the correct columns.
- Smart pal review games that encompass all geometry concepts in the unit.

- Geometry formula sheet will be provided to those who need it.
- Provide calculators to assist with formula calculations.
- Provide completed study guides.
- Heterogeneous grouping to provide peer to peer interaction.

Integrated/Cross-Disciplinary Instruction	Resources
- **Architecture:** students will utilize skills and concepts learned about surface area and volume and apply it to playground construction. - Make the geometry concepts relevant to the students lives. Apply volume to the process of filling a swimming pool with water, or how much ice cream you can fit inside an ice cream cone. Apply the concept of surface area to wrapping a present for a friend's birthday.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing with classifying shapes and solids Unit Cubes Activity Generator CD-Rom Irregular Figures directions and pre-cut shapes Hands-On solids and net shapes Playground design directions and paper

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:29AM

Unit: Lines, Angles, and Transformations (Week 26, 3 Weeks) 📅 📊

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.7. Solve linear equations in one variable.
- 8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

CommonCore: Mathematics, CommonCore: Grade 8, Geometry
8.G Understand congruence and similarity using physical models, transparencies, or geometry software.

- 8.G.1. Verify experimentally the properties of rotations, reflections, and translations:
- 8.G.1a. Lines are taken to lines, and line segments to line segments of the same length.
- 8.G.1b. Angles are taken to angles of the same measure.
- 8.G.1c. Parallel lines are taken to parallel lines.
- 8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- 8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- 8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
- 8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Description of Unit	Essential Questions
This unit will introduce students to the properties of angles (complementary and supplementary). They will also discover properties of corresponding alternate, interior angles, parallel lines and transversals and apply them to finding the sum of the interior and exterior angles of any polygon. Lastly, students will be introduced to the four types of transformations. Students will see these transformations in various contexts including on a coordinate grid.	- How is it possible that by knowing that the angles in a triangle add up to 180 degrees, we can find out the sum of the angles of any polygon? - How can we use multiple transformations to create a larger design?

Knowledge	Skills
Students will know that: - complementary angles have a sum of 90 degrees, and supplementary angles have a sum of 180 degrees. - when a transversal cuts across two parallel lines, special angles are formed: corresponding, alternate interior, alternate exterior, vertical, and supplementary. - one can break apart any polygon into triangles, then add the sum of all triangles to find the total number of degrees of the given polygon. - a translation is when one slides a figure, and it produces a congruent image of the original. - a reflection is when one flips a figure across a line, and it produces a congruent image of the original. - a rotation is when one turns a figure, and it produces a congruent image of the original. - a dilation is when one shrinks or expands an image, and it produces a similar image of the original. The image will be the same shape but a different size. - all transformations can be performed on a set of ordered pairs in addition to on a coordinate grid.	Students will be able to: - apply their knowledge of complementary and supplementary angles to find missing angle measures by setting up an equation. - calculate missing angle measures by identifying the relationship between different angles. - calculate the sum of the interior angles of any n-sided polygon. - calculate the measure of an exterior angle of any regular n-sided polygon. - perform multiple transformations on a given object. - discover the image points of a figure after a given transformation by following mathematical rules.

Assessments

Do Now Exercises
Diagnostic: Instructional/Assessment Focus

These do now exercises will provide data for the teacher to review, and remediate when necessary, the concepts learned throughout the unit.

Angles Exploratory Activity
Formative: Other written assessments
Students will demonstrate the formula for finding the sum of the interior angles of any polygon.

Transversal Cut Out
Formative: Self Assessment
This assessment will determine students' understanding of the relationship between angles formed by a pair of parallel lines cut by a transversal.

Angles Unit Quiz
Formative: Written Test
This quiz will focus on transversals and angle measures.

Smart Pal Reviews
Formative: Suggested Instructional/Assessment Strategies
These smart pal reviews will provide a quick whole class assessment to determine if the students truly grasp the material presented.

Lines, Angles, and Transformations Unit Test
Summative: Written Test
Assessment on all unit content.

Activities	Activities to Differentiate Instruction
• **Interior Angles Exploratory Activity:** in this teacher-generated activity, students will discover on their own how to find the sum of the interior angles in any n-sided polygon. Students will begin by breaking the polygon into triangles and work through the algebraic version of that action. Students will discover the formula on their own. • **Transformations Smartboard:** in this teacher-generated mini unit presentation, students will be able to manipulate various shapes and objects to perform the required transformation. From there, students will explore to discover the algebraic representation of the transformation.	• **Transversal Cut-Out:** teacher-generated activity in which students reproduce a drawing of two parallel lines cut by a transversal. Students will cut out each of eight angles. Students will be able to manipulate the angles and to determine which are exactly the same. This provides a hands-on lesson on congruency, a very abstract concept. • **Human Crane Game:** a kinesthetic exercise in which students give their fellow classmates directions (both verbal and algebraic) to lead them to the prize on the other side of the room. This can be modified to include reflections and rotations as well.

- **Tessellations:** in this activity, students will create their own tessellation by beginning with a "basic model" and translating it to different parts of the paper.
- Smartpal review games that tie together all of the concepts on lines, angles and transformations.
- Group stations that review each of the four types of transformations.

- "Spinning" review in which students understand how far to turn to demonstrate 90, 180, and 270-degree rotations.
- Provide completed study guides
- Heterogeneous grouping to provide peer to peer interaction.

Integrated/Cross-Disciplinary Instruction	Resources
Art: students will create their own tessellation by beginning with a basic unit and translating the basic unit across the sheet of paper without any gaps. **Physical Education:** students will engage in physical responses required to complete certain tasks. This will include the human crane game and the "spinning" review.	Glencoe Mathematics: Algebra Concepts and Applications-textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing with transformations Interior angles exploratory activity Teacher-generated directions for creating your own tessellation

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:29AM

Unit: Powers & Roots / NJASK (Week 29, 4 Weeks) 🖩 🖼

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CommonCore: Mathematics, CommonCore: Grade 8, The Number System
8.NS Know that there are numbers that are not rational, and approximate them by rational numbers.

- 8.NS.1. Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.
- 8.NS.2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Work with radicals and integer exponents.

- 8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- 8.EE.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where *p* is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that 2 is irrational.
- 8.EE.3. Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- 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.

CommonCore: Mathematics, CommonCore: Grade 8, Geometry
8.G Understand and apply the Pythagorean Theorem.

- 8.G.6. Explain a proof of the Pythagorean Theorem and its converse.
- 8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- 8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Description of Unit	Essential Questions
In this unit, students will work extensively with exponents and square roots, including the use of negative exponents. Students will learn how to simplify radical expressions, including both multiplication and division expressions. The students will apply these skills to work with the Pythagorean Theorem. Lastly, students will work with rational and irrational numbers.	- In what job or profession is it imperative to have a strong foundation in geometric skills? - Why is it important to have a strong base knowledge of order of operations in order to simplify radical expressions? - How are we building upon our knowledge of solving equations and applying that knowledge to the Pythagorean Theorem?

Knowledge	Skills
Students will know that: - When multiplying an expression that has terms with the same base, one ADDS the exponents. - When dividing an expression that has the same base, one SUBTRACTS the exponents. - To eliminate a negative exponent, one moves its location in the fraction (from numerator to denominator or vice-versa). - Anything raised to the zero power is equal to one. - The purpose of scientific notation is to reduce large numbers or to expand small numbers. - One can simplify expressions in scientific notation by following the rules of exponents. - The square root of a number means: what number squared will equal the number under the radical symbol. - To simplify a radical expression, one follows the order of operations. - The Pythagorean Theorem applies only to right triangles.	Students will be able to: - Simplify an expression by following the rules of exponents. - Simplify an expression that contains negative exponents and an exponent of zero. - Convert numbers from scientific notation and vice-versa. - Evaluate and estimate the square root of a number. - Simplify a radical expression by following the order of operations. - Apply their knowledge of radicals to the Pythagorean Theorem. - Solve equations that involve a variable being raised to the second power. - Classify a number as being either rational or irrational.

- A rational number can be written as a fraction and represents repeating and terminating decimals.
- An irrational number cannot be written as a fraction and is a non-repeating, non-terminating decimal.

Assessments

Do Now Exercises
Diagnostic: Suggested Instructional/Assessment Strategies
   These do now exercises will provide opportunities to review, and to remediate as necessary, the concepts that have been learned throughout the unit.

Exponents Exploratory Activity
Formative: Self Assessment
   Through this self-assessment, students will discover on their own the rules of exponents. Students will demonstrate their ability to simplify problems involving the rules of exponents.

Powers Unit Quiz
Formative: Written Test
   Written quiz on the rules of exponents and scientific notation.

Pythagorean Theorem Stations
Formative: Other written assessments
   Written assessment on the Pythagorean Theorem and its application to real-world situations.

NJ ASK Stations
Formative: Other written assessments
   A variety of activities to review concepts from throughout the year in preparation for the NJASK.

Smart Pal Reviews
Formative: Other written assessments
   Unit skill review assessment including: the rules of exponents, simplifying radical expressions, and the Pythagorean Theorem.

Powers and Roots Unit Test
Summative: Written Test
   Written test on unit content.

Activities	Activities to Differentiate Instruction

- **Rules of Exponents Exploratory Activity:** (from the activity generator) Students discover the rules of exponents on their own and list them in written form.
- **Open-ended Responses:** teacher-generated. real-world questions for which the students will be utilizing the Pythagorean Theorem.
- **NJ ASK Review Stations:** teacher-generated activity in which heterogeneously-grouped students will review topics asssessed on the state test.
- Interactive Smartboard lessons on scientific notation, radicals, and the Pythagorean Theorem.
- Smartpal reviews incorporated throughout the unit on the topics of: the rules of exponents, scientific notation, square roots, and Pythagorean Theorem.

- **Pythagorean Theorem Stations:** teacher-generated activity in which students work cooperatively to answer real-world questions utilizing the Pythagorean Theorem. While the students are working in stations, the teacher will provide individual help as needed.
- **Jeopardy Fraction Review:** teacher-generated activity to review fractions and equations. This will be used while reviewing for the NJ ASK.
- "Group Meetings" to provide remediation work when necessary (especially involving the rules of exponents and radical expressions).
- Completed study guides for those who need them.
- Calculators to assist with calculations (especially with the Pythagorean Theorem).
- Peer grouping involving heterogeneous groups.

Integrated/Cross-Disciplinary Instruction	Resources
- **Physical Education:** apply the concept of the Pythagorean Theorem to finding the distance from home plate to second base on a baseball diamond. If time permits, take the class outside and actually measure out the distance to see if it matches their calculations.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing with rules of exponents and radical expressions Rules of Exponents exploratory activity Course 2 workbook exercises for exponents and Pythagorean Theorem. Teacher-generated problems for the Pythagorean Theorem and NJASK review stations

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:30AM

Green Brook Township
Public Schools

Unit: Polynomials and Systems/Final (Week 33, 5 Weeks) 📖 🖼️

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

CommonCore: Mathematics, CommonCore: Grade 8, Expressions & Equations
8.EE Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.8. Analyze and solve pairs of simultaneous linear equations.
- 8.EE.8a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

CommonCore: Mathematics, CommonCore: HS: Algebra, Arithmetic with Polynomials & Rational Functions
A-APR Perform arithmetic operations on polynomials.

- A-APR.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.

CommonCore: Mathematics, CommonCore: HS: Algebra, Reasoning with Equations & Inequalities
A-RE I Solve systems of equations.

- A-REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Description of Unit	Essential Questions

Polynomials will be the focus of this unit. Students will learn how to identify monomials, binomials, and trinomials. They will also learn how to determine the degree of the polynomial and write it in ascending or descending order. During the unit, students will be introduced to adding and subtracting polynomials and will learn how to multiply a monomial and a binomial and to multiply a binomial with a binomial using a box model.   The FOIL method for these calculations also will be introduced. Students will also revisit systems of equations. Students will begin by reviewing solving systems by graphing and then will learn how to solve a system of equations by elimination.

- Why is it important to have a strong foundation of knowledge about integer rules before learning about polynomials?
- What visual aides are available to assist with multiplying polynomials?
- When is it practical to solve a system of equations by graphing? By elimination?

Knowledge	Skills
Students will know that: - A polynomial can be classified as a monomial (one term), binomial (two terms), or a trinomial (three terms). - In order to put a polynomial in descending order your must order the exponents from greatest to least. - The degree of a polynomial is the degree of the largest term. - In order to simplify polynomials you must line up the like terms, and combine them like normal. - When multiplying polynomials you multiply the coefficients together then add the exponents. - FOIL is an acronym used to multiply binomials together. - The point of intersection is the solution to a system of equations. - When solving a system of equations you can also eliminate one of the variables by multiplying by a constant. - When a variable is eliminated you solve for the remaining variable in a system of equations. You then plug in your answer to reveal the value of the other variable.	Students will be able to: - Identify the type of polynomial (monomial, binomial, trinomial). - Discover the degree of a polynomial. - Order a polynomial for a given variable (ascending or descending order). - Simplify polynomial expressions by adding, subtracting, or multiplying. - Solve a system of equations by graphing. - Eliminate a variable in a system of equations by adding or subtracting first. - Eliminate a variable in a system of equations by multiplying one of the equations by a constant.

Assessments

Do Now Exercises

Formative: Suggested Instructional/Assessment Strategies
  These do now exercises will provide data for review and remediation of the concepts learned in class.

Polynomials Puzzle
Formative: Self Assessment
  This self assessment encourages students to solve a puzzle by simplifying polynomial expressions.

Polynomials Unit Quiz
Formative: Written Test
  This unit quiz will include problems on polynomials and simplifying polynomials.

Systems Problem Solving
Formative: Other written assessments
  This assessment will have students apply their knowledge of solving a system of equations to real- world situations. This will assess their knowledge of solving a system by elimination.

Koosh Ball Review
Formative: Other written assessments
  This review will provide data to the teacher as students solve selected problems from the Smartboard review on a sheet of paper.

Polynomials and Systems Test
Summative: Written Test
  Written assessment on unit content.

Final Exam
Summative: Benchmark Assessment
  On the final exam students will demonstrate the mathematical concepts and skills learned throughout the year.

Activities	Activities to Differentiate Instruction
Polynomials Puzzle: (from the activity generator) Students work with a partner to piece together a puzzle containing polynomials using the FOIL method to multiply binomials. **Systems Problem Solving:** teacher-generated activity applying knowledge of systems of equations to real- world examples. **Final Exam Review Stations:** teacher-generated stations to review concepts from throughout the year.	**Punnett Square Multiplication:** this activity will build upon the student's knowledge of the Punnett Square from science class and will provide a concrete example in which students are able to see that each term in a polynomial must multiply to another term in the opposite polynomial. **Geometry Polynomials:** this will serve as a challenge activity for those doing well with polynomials. Students will utilize their knowledge of area and perimeter and apply it to polynomials.

The students will be heterogeneously grouped for this activity.
- Interactive Smartboard presentations showing students how to add, subtract, and multiply polynomials.
- Smartpal reviews for all concepts related to polynomials and systems of equations.

- **Koosh Ball Exam Review:** this interactive Smartboard review game will include concepts learned earlier in the year. Topics will include: expressions, equations (including special cases), probability, and proportions.
- **Graphing Calculator Activity**: this activity will introduce students to the graphing calculators by having them solve a system of equations, then check their answer on the calculator. Students will also be able to see the graphs drawn and the point of intersection for the equations.
- Provide completed study guides for those who require them.
- Small group instruction remediating classroom concepts (specifically solving systems by graphing and elimination).
- Heterogeneous grouping for classroom exercises.

Integrated/Cross-Disciplinary Instruction	Resources
Science: tie the concept of multiplying binomials to science class and the completion of a Punnett Square. Students will see that every box needs to be completed. **Economics:** tie the concept of a system of equations to solving a money problem in which you know how many coins you have and the total amount of money, and you want to find out how many of each coin you have.	Glencoe Mathematics: Algebra Concepts and Applications- textbook and workbook Spectrum Math (Grade 8) Pre-Algebra textbook and workbook Punchline/Pizzazz worksheets (self correcting) Smartboard Lessons Kuta generated worksheets dealing polynomials and systems of equations Activity Generator CD-ROM (for the polynomials puzzle activity) Graphing calculators (used to check solutions for the system of equations)

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Unit Map 2013-2014
Green Brook Township School District
/ _Algebra Concepts Curriculum (D)_ / Grade 8 (District Middle Curriculum)
Tuesday, August 27, 2013, 8:30AM

Green Brook Township
Public Schools

Unit: Roller Coaster Project (Week 38, 2 Weeks)

New Jersey Core Curriculum Standards

CommonCore: Mathematics, CommonCore: Grade 8, Mathematical Practice
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.

Description of Unit	Essential Questions
This unit is centered around roller coasters: the mechanics, the construction, and the science concepts of force and momentum. Once the students have mastered the background knowledge, they will create their own paper roller coasters. Students will work with a partner to create a paper rollercoaster that meets specific requirements (minimally one drop and the ability to contain a marble along its entire length). Students will be responsible for accurately measuring the length of track and the length of the support columns for their coasters. Lastly, students will join with other groups to create a larger, continuous roller coaster.	- How can we apply science and mathematical concepts to the idea of a paper rollercoaster? - Why is it important to have a strong support system for the paper roller coaster?

Knowledge	Skills
Students will know that: the point of the greatest potential energy for a roller coaster is at the top of the first hill.	Students will be able to: define the differences between potential and kinetic energy.

- the energy the roller coaster has in motion is its kinetic energy.
- the supports for the roller coaster are the most important component.
- to create a loop-de-loop, the roller coaster needs to have significant potential energy.
- to find the actual length of the scale model to the actual roler coaster, one needs to set up a proportion.

- cooperatively work with a fellow student to create a paper roller coaster.
- measure the track length and the height of the supports.
- correctly set up a proportion to find the actual length of a the roller coaster using a given scale.

Assessments

Energy Worksheets
Formative: Other written assessments
Using a worksheet, students will be assessed on knowledge of potential and kinetic energy and basic construction techniques.

Paper Roller Coasters
Formative: Personal Project
Using a rubric, students will be assessed on how they have met each criteria for the construction of the roller coaster.

Mega Roller Coaster
Summative: Personal Project
This project will assess students' abiltiy to work cooperatively and to create a giant roller coaster by connecting multiple roller coasters together.

Activities	Activities to Differentiate Instruction
Paper Roll Coaster Construction: students will work cooperatively with a partner to create a paper roller coaster model. Students will be asked to meet certain criteria including: having at least one drop, must start twelve inches from the base, marble can never leave the track, and marble must end evenly with the cardboard base. - Worksheets that reinforce knowledge of what makes roller coasters work, and how they are safely constructed.	- Students and groups who are having a difficult time making the support beams or tracks will be provided with paper models that have dotted lines for folding. - Completed models will be presented as models.
Integrated/Cross-Disciplinary Instruction	**Resources**

• **Engineering:** create a model paper roller coaster that is consistently able to transport a marble from the top to the bottom. • **Team Work:** students will be forced to work as a team to problem solve whenever an issue arises with their rollercoaster.	Internet videos showing roller coaster mechanics. Completed models and pictures of paper roller coasters. Teacher-created directions for constructing a paper roller coaster. Worksheets reviewing the mechanics of roller coasters.

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