



They Should Know This Already!

Strategies for Revisiting Elementary Content with Secondary Students

A “Mini-Workshop” Presented at the WIU Mathematics Teachers Conference 2011
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Promoting practice of multiplication/division facts

Times Attack

- Go to <http://www.bigbrainz.com/Multiplicationp.php>
- Fun, interactive game that drills in ideas of multiplication
- Download Free Version for either Mac or Windows or you can buy the program
- Tests division, subtraction, addition as well
- Supplies a “pre-test” so that the program and student knows where s/he is at and a “post test” so student can see progress

Times Square

- Go to <http://hoodamath.com/games/multiplicationgame.php>
- Fun, interactive game that utilizes multiplication facts
- Use your multiplication facts to beat the computer. Use your mouse to move the markers. You and the computer take turns moving one marker at a time. Get 4 in a row before the computer and you win.
- Example of game on separate sheet

Multiplication Timed-Test

During my student teaching experience, I went to a 6th grade level meeting. All the 6th grade teachers discussed students not knowing their math facts. My cooperating teacher decided to implement a program into the classroom. Every Monday the students would make flashcards on note cards for the multiplication facts that they were to be studying for that week. We started at 3s and each week went up. The math facts went up to 12s. Every day at the beginning of math time, the students would pull out their flashcards for 2-3 minutes and go through the flashcards. On Fridays, the students would have a 2 minute timed test on the multiplication facts for that week. The students who completed the test and got 80% or better would get a cookie on that following Monday. The students who completed the test and got 100% would get their name in a drawing. One student would be chosen and they would get Subway lunch on that following Monday. They would also get their picture taken and be showcased as the “star student” for multiplication facts for the week. This continued each week until they finished the 12 facts. Once they got past the 12s, the students would then take a 2 minute timed test that involved a variety of multiplication facts. We also documented student progress each week on a bar graph so that the students could see how the class as a whole was doing with each multiplication fact.

KenKen

- See separate sheet for more instructions and grids

Beat the calculator

- One student uses calculator while one student does not
- Teacher shows math facts. Students compete to see who knows math facts faster
- Point is to see that knowing math facts by heart is faster than using a calculator.
- Can be used in “around the world” style
- Can be used with division as well

Times Square

(Electronic versions available at <http://hoodamath.com/games/multiplicationgame.php>)

Object of the Game: To get four squares in a row—vertically, horizontally, or diagonally.

1. To begin the game, Player 1 moves a band to a number in the factor list of numbers 1-9 along the bottom of the page.
2. Player 2 then moves the other band to any number in the factor list (including the number marked by Player 1). The product of the two marked numbers is determined, and that product is colored red for Player 2.
3. Player 1 moves *either* band to another number, and the new product is colored white for Player 1.
4. Players take turns moving a band, and each product is marked red or white, depending on which player made the product. However, if a product is already colored, the player does not get a square for that turn.
5. Play continues until one player wins, or until all squares have been colored.

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

1 2 3 4 5 6 7 8 9

Rules for Playing KenKen

1. Note the Grid Size (the puzzle below has Grid Size = 6 because it is 6 x 6).
2. Fill in the whole numbers from 1 to Grid Size.
3. Do not repeat a number in any row or column (like a Sudoku puzzle).
4. The numbers in each heavily outlined set of squares, called cages, must combine (in any order) to produce the target number in the top corner using the arithmetic operation indicated.
5. Cages with just one square should be filled in with the target number in the top corner.
6. A number can be repeated in a cage as long as it is not in the same row or column.

1	20×		2÷	11+	3÷
5+		4-			
60×			3-		6
	5	3÷	11+	1-	
5-				6×	20×
4-		4			

KenKen Challenge!

Easy: 4 x 4

3-	7+	2	6×
		2-	
1-	1		3-
	2÷		

www.kenken.com

Medium: 6 x 6

13+		7+	20×		1-
30×			3÷		
		1-		72×	
1-		10+			1-
2÷	2-	3-	6+		
			11+		

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Hard: 8 x 8

8×			21+			15×	
6×		15+		18+			15+
2-	4-		6+				
		3-	2-	28×		4÷	
1-	22+			12+			2-
		20+		35×	40×		
			4		1-	9+	3÷
42×							

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Super Hard! 9 x 9

3-	10+		108×			126×		6+
		17+			56×			
12+	196×			3+		14+		4÷
		5184×						
	17+		840×			24×		
4-	30×	32×		8-		945×	1-	1-
			3+	3-	2-			
24×	7-						2÷	3÷
		280×						

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Fractions and Fraction Computation

Are your students having trouble with topics such as slope or solving equations because they do not understand fractions or how to compute expressions with fractions in them? Well, here are some possible tools to use to help both their conceptual understanding and computation skills.

1. Fraction strips/circles/etc.

Manipulative that can be easily created with simply paper and scissors. Can help students gain a better conceptual understanding of fractions by comparing different sizes fraction strips, circles, or any other shape. Students will be able to explore relationships between fractions and what fractions are equivalent to each other.

2. Fraction operations using fraction strips

Fraction strips can also be used to model the addition, subtraction, and even division of fractions. Now, instead of students feeling like a teacher is just telling them that $1/3 + 1/6 = 1/2$, they can see why that is true visually.

3. http://www.mathplayground.com/visual_fractions.html (Online manipulative)

The students' goal for this online manipulative is to find a fraction between two given fractions with different denominators. Students are asked to find a common denominator and then move the slider so that each fraction has an equal number of strips. Then, the students type in their answer and check to see if it is correct.

4. http://nlvm.usu.edu/en/nav/frames_asid_106_g_2_t_1.html?from=category_g_2_t_1.html (Online manipulative)

In this online manipulative, students must find a common denominator of two given fractions. Then, they are asked to add their two fractions and check their answer. Strips at the top of the page are adjusted when students check their answers and can help students see why their answer was correct or incorrect. Also, students can adjust the strips themselves to help them find a common denominator or add the fractions.

Conceptual Understanding of Integers

Two-Colored Counters – Improve your students' understanding of adding and subtracting integers by using two-colored counter in the classroom; this helps with subtracting negative numbers too!

* Red side represents negative numbers and white side represents positive numbers (or vice versa).

- Given a problem $-5 + 3$, students begin with 5 red counters. Students then add 3 white counters. White and red counters “cancel out”. In this case, 3 pairs of counters cancel out. Students are left with 2 red counters. The answer is -2 .
- Given a problem $6 - (-2)$, students begin with 6 white counters. Students will notice that they have to take away 2 red counters, but they don't have any to take away. Students will then “add zero” by adding in two pairs of red and white counters. Students are now able to take away two red counters. They are left with 8 white counters. The answer is 8.

* For deeper understanding, have students formulate rules for integer addition and subtraction.

Algebra Tiles – Use colorful tiles to help your students visualize adding and subtracting integers!

* Small yellow squares represent positive numbers and small red squares represent negative numbers.

- Algebra tiles can be used the same way that two-colored counters are used.
 - *Again, for deeper understanding, have students formulate rules for integer addition and subtraction.
- * The algebra tiles can also be used to help students with multiplying.
- Given the problem 3×-4 , the first number represents the number of rows and the second number represents the number of columns. In this case, there will be 3 rows and 4 columns of red squares. All together, there are 12 red squares.

Integers with Cards – Enable your students to understand and practice adding and subtracting integers by having them play against a partner in this engaging card game!

** Aces are 1 and face cards are 10. Red cards are negative numbers and black cards are positive numbers.*

- Students break off into pairs and each group has a deck of playing cards.
- Students draw a number line from -15 to 15, or of greater range depending on learning level.
- Pick the top card from deck and that number is the “goal”.
- Beginning at 0, students take turns picking a card and adding that number to 0.
 - Students continue previous step adding their new card numbers to the number they previously landed on.
- Students continue until someone lands on the “goal”. This student is the “winner”.
- Once finished, students can play again subtracting their numbers as opposed to adding them.
 - * For added challenge, have students tell their partners what number they would need to pull to reach the goal.
 - * *This game can also be used to help students practice their multiplying. It would be played the same, but the number line would need to be considerably longer.*

Walk the Plank – Students will help the pirates send their teacher to the depths of the sea with this interactive game that helps with their understanding of adding and subtracting integers!

- Go to the following web address: <http://www.math-play.com/integers-game.html>
- It may take a while to load.
- Create the teacher by choosing hair color and style and skin color.
- Solve integer equations involving positive and negative numbers to help send the teacher closer and closer to the edge of the plank.
- For every problem answered incorrectly, roll a pair of die and the teacher will step back the number of steps rolled.
- Complete 10 problems all together.

Other Ways to Help with Conceptual Understanding of Integers

- Before students can enter the classroom, show them a flashcard and ask them if the answer will be negative or positive and have them explain why.
- Have students work in partners and quiz each other on what happens when adding two negatives, subtracting two negatives, etc.
- Use flashcards in class.
- Use other objects like money to help students visualize adding and subtracting integers.
- Go to www.nlvm.usu.edu for great interactive games to help students better understand concepts like adding and subtracting integers, multiplying integers, adding and subtracting fractions, and hundreds more!

WIU Conference

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Integer Practice

How do we get students to want to practice working with integers?

Intrinsic motivation! If we show students that practice can be fun and challenging, they will want to practice on their own. Here are three fun ways to get students to practice!

Multiplication of Integers:

<http://www.berghuis.co.nz/abiator/maths/sa/saintgermultiply.html#section3>

- This is a website that is very easy to use. Students can simply type in the web address and begin challenging themselves right away.
- Countdown: the basic version just asks the students to enter the product for the multiplication problem, while a timer counts down from 60 seconds.
- Extension: my favorite version of this game asks the students to focus on solving the problems correctly by rewarding the student with bonus time for each correct answer. Positive reinforcement!
- 20 Questions: this final version counts how long it takes for the students to get 20 more correct answers than incorrect answers.
- This tool is great for a quick practice and can be used over and over again without getting boring!

Just the Facts

- Designed by Randy Hengst, this game is another great way for students to enjoy math fact practice.
- Downloadable on iTunes (Just the Facts), this game is a cheap (\$0.99) way for students to use their iPod Touch's for academic use! Whole classrooms can use the game with one download purchase if the iPods are synced to the same iTunes account.
- This product has the option of using only positive numbers or mixing in negative numbers!
- And say your student really struggles with their 7 times tables? You can design the game so that it asks the students questions they need to work on.
- The best part! You can keep record of each time played, so you can see progress over time. I have designed logs that students love to update and watch their times go down.

National Library of Virtual Manipulatives

<http://nlvm.usu.edu>

- This website offers a wide variety of virtual manipulatives for all sorts of practice. While the overall site does come at a cost, they offer a 60 day free trial that I highly suggest.
- The two that seem to fit integer practice the best include "Number Puzzles" and "Circle 21."
- Both of these games can be found under the Number and Operations - Grades 6-8 box. Click on this box and scroll down to find these two games.
- Both of these games challenge students to find numbers that sum to a certain amount within a puzzle. It's tricky but rewarding when you finally reach the right answer. The best part? These games can both be created with paper, making the game an affordable method of practice.

Questions? Contact Dani Rogers at danielle-rogers@augustana.edu

Basic Algebra Station

As many of you know, students are unable to compute basic computations using variables in algebra. This station is designed to offer some suggestions of ideas that will help students with this skill. Thank you for coming to this station, and we hope you will find at least one idea that you can take away from this.

Sub-stations

1) Using Algebra Tiles to add and subtract variables.

In this station let each color of tile represent a variable. For example, yellow tiles are “y” and red tiles are “r.” Then try to complete any example you wish. Try for example, $3y - y$.

2) Using Algebra Tiles to add system of equations.

In this station each color of tile will represent a color. For example, yellow tiles are “y,” red tiles are “r,” and so on. Try to complete a few examples such as adding $3b + 2y - 4r = 4$ to $-y = 2r - b = -1$.

3) Using Algebra Tiles to solve simple equations.

Big green tiles will represent positive “x” and a big red tile will represent negative “x.” Then, small yellow tiles will be positive 1 and small red tiles will be negative 1. Try solving examples such as $3x - 2 = 4$.

4) Using Cuisenaire Rods to solve simple equations.

Show that 4 red rods equal 1 blue rod. So $4r = b$.

Connecting Session Ideas with the Common Core Mathematics Standards

Vital Elementary Knowledge (Pages 12 and 13)

According to the Common Core Standards, students *should* have mastered the material listed below by the end of 6th grade. Middle and high school teachers know, however, that many students have not adequately mastered this material in that time frame. This session highlights teaching strategies for revisiting this material with students in grades 7-10.

3.OA: Operations and Algebraic Thinking

- Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$.*
- Apply properties of operations as strategies to multiply and divide. *Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)*
- Understand division as an unknown-factor problem. *For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.*
- Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

3.NF: Number and Operations – Fractions

- Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.
- Understand a fraction as a number on the number line; represent fractions on a number line diagram.
 - Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
 - Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
- Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
 - Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
 - Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
 - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.*
 - Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

4.OA: Operations and Algebraic Thinking

- Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

4.NF: Number and Operations – Fractions

- Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
- Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.
- Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
 - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
 - Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.*
 - Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
 - Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.*
 - Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)*

5.NF: Number and Operations – Fractions

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.)*
3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
 - a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)*
7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
 - a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.*
 - b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.*

6.NS: The Number System

5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
 - a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.
 - b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
 - c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
7. Understand ordering and absolute value of rational numbers.
 - a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.*
 - b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write $-3 \text{ } ^\circ\text{C} > -7 \text{ } ^\circ\text{C}$ to express the fact that $-3 \text{ } ^\circ\text{C}$ is warmer than $-7 \text{ } ^\circ\text{C}$.*
 - c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.*
 - d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*

6.EE: Expressions and Equations

1. Write and evaluate numerical expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
 - a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as $5 - y$.*
 - b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.*
 - c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.*
3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.*
4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.*

“Big Ideas” in Grades 7-10 that Require the Vital Elementary Knowledge (Page 14)

The importance of the elementary content listed on pages 1 and 2 is probably self-evident. However, in an attempt to underscore how that content is foundational for future expectations, a sampling of “big ideas” from the Common Core Standards for grades 7-10 is provided below. Students who have not yet mastered the elementary content are not likely to find success in developing these ideas.

Grade 7 Overview

Ratios and Proportional Relationships

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

The Number System

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

Expressions and Equations

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

Grade 8 Overview

The Number System

- Know that there are numbers that are not rational, and approximate them by rational numbers.

Expressions and Equations

- Work with radicals and integer exponents.
- Understand the connections between proportional relationships, lines, and linear equations.
- Analyze and solve linear equations and pairs of simultaneous linear equations.

Functions

- Define, evaluate, and compare functions.
- Use functions to model relationships between quantities.

High School Standards: Number and Quantity Overview

The Real Number System

- Extend the properties of exponents to rational exponents
- Use properties of rational and irrational numbers.

Quantities

- Reason quantitatively and use units to solve problems

The Complex Number System

- Perform arithmetic operations with complex numbers
- Represent complex numbers and their operations on the complex plane
- Use complex numbers in polynomial identities and equations

Vector and Matrix Quantities

- Represent and model with vector quantities.
- Perform operations on vectors.
- Perform operations on matrices and use matrices in applications.

High School Standards: Algebra Overview

Seeing Structure in Expressions

- Interpret the structure of expressions
- Write expressions in equivalent forms to solve problems

Arithmetic with Polynomials and Rational Expressions

- Perform arithmetic operations on polynomials
- Understand the relationship between zeros and factors of polynomials
- Use polynomial identities to solve problems
- Rewrite rational expressions

Creating Equations

- Create equations that describe numbers or relationships

High School Standards: Functions Overview

Interpreting Functions

- Understand the concept of a function and use function notation

Building Functions

- Build a function that models a relationship between two quantities

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