

**Class:** Eric Errthum - MATH050: Summer 2020

**Class Code:** NC3JE-4WEDT

**Subject:** Pre-Algebra

**Instructor:** Prof. Errthum





**Class Dates:** 05/04/2020 - 06/05/2020

**Class Content:** 341 topics / 329 accessible topics


 Accessible Topic - Topics accessible to visually impaired students using a screen reader.

## Whole Numbers (28 Topics)







### *Place Value, Expanded Form, and Numeral Translation* (4 Topics)

- Whole number place value: Problem type 1 
- Whole number place value: Problem type 2 
- Numeral translation: Problem type 1 
- Numeral translation: Problem type 2 









### *Addition and Subtraction* (1 Topic)

- Word problem with addition or subtraction of whole numbers 










### *Multiplication and Division* (6 Topics)

- Multiplication as repeated addition 
- Multiplication by 10, 100, and 1000 
- Multiplication with trailing zeros: Problem type 1 
- Word problem with multiplication or division of whole numbers 
- Word problem with multiplication and addition or subtraction of whole numbers 
- Word problem with division of whole numbers and rounding: Problem type 2 

### *Ordering, Rounding, and Estimating* (8 Topics)

- Even and odd numbers 
- Introduction to inequalities 
- Ordering large numbers 
- Rounding to tens or hundreds 
- Rounding to hundreds or thousands 
- Rounding to thousands, ten thousands, or hundred thousands 
- Estimating a sum of whole numbers: Problem type 2 
- Estimating a difference of whole numbers: Problem type 2 




### *Exponents and Order of Operations* (9 Topics)

- Writing expressions using exponents 
- Introduction to exponents 
- Power of 10: Positive exponent 
- Introduction to parentheses 
- Introduction to order of operations 
- Order of operations with whole numbers 
- Order of operations with whole numbers and grouping symbols 
- Order of operations with whole numbers and exponents: Basic 
- Understanding the distributive property 













## Integers (16 Topics)

### *Plotting, Ordering, and Absolute Value* (4 Topics)

- Plotting integers on a number line 

- Writing a signed number for a real-world situation 
- Ordering integers 
- Absolute value of a number 






#### ***Operations with Integers***(12 Topics)

- Integer addition: Problem type 1 
- Integer addition: Problem type 2 
- Integer subtraction: Problem type 1 
- Integer subtraction: Problem type 2 
- Integer subtraction: Problem type 3 
- Word problem with addition or subtraction of integers 
- Operations with absolute value: Problem type 2 
- Integer multiplication and division 
- Multiplication of 3 or 4 integers 
- Exponents and integers: Problem type 1 
- Exponents and integers: Problem type 2 
- Order of operations with integers and exponents 









### **Algebraic Expressions and Equations** (33 Topics)

---






#### ***Evaluating Expressions*** (5 Topics)

- Evaluating an algebraic expression: Whole number addition or subtraction 
- Evaluating an algebraic expression: Whole number multiplication or division 
- Evaluating an algebraic expression: Whole numbers with two operations 
- Evaluating a linear expression: Integer multiplication with addition or subtraction 
- Evaluating a quadratic expression: Integers 










#### ***Distibutive Property and Combining Like Terms*** (8 Topics)

- Multiplying a constant and a linear monomial 
- Distributive property: Whole number coefficients 
- Distributive property: Integer coefficients 
- Combining like terms: Whole number coefficients 
- Combining like terms: Integer coefficients 
- Using distribution and combining like terms to simplify: Univariate 
- Using distribution with double negation and combining like terms to simplify: Multivariate 
- Combining like terms in a quadratic expression 







#### ***One-Step Linear Equations*** (5 Topics)

- Additive property of equality with whole numbers 
- Additive property of equality with integers 
- Solving for a variable in terms of other variables using addition or subtraction: Basic 
- Multiplicative property of equality with whole numbers 
- Multiplicative property of equality with integers 

#### ***Multi-Step Linear Equations*** (9 Topics)

- Identifying solutions to a linear equation in one variable: Two-step equations 
- Using two steps to solve an equation with whole numbers 
- Additive property of equality with a negative coefficient 
- Solving a two-step equation with integers 
- Introduction to solving an equation with parentheses 
- Introduction to solving an equation with variables on the same side 
- Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution 
- Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution 
- Solving for a variable in terms of other variables using addition or subtraction: Advanced 








### ***Applications*** (6 Topics)

- Writing a one-step expression for a real-world situation 
- Translating a phrase into a one-step expression 
- Translating a phrase into a two-step expression 
- Translating a sentence into a one-step equation 
- Translating a sentence into a multi-step equation 
- Solving a word problem with two unknowns using a linear equation 





## **Fractions** (43 Topics)

---




### ***Prime Numbers, Factors, and Multiples*** (7 Topics)

- Factors 
- Prime numbers 
- Greatest common factor of 2 numbers 
- Least common multiple of 2 numbers 
- Finding the next terms of an arithmetic sequence with whole numbers 
- Finding the next terms of a geometric sequence with whole numbers 
- Finding patterns in shapes 











### ***Equivalent Fractions*** (5 Topics)

- Introduction to fractions 
- Understanding equivalent fractions
- Equivalent fractions 
- Introduction to simplifying a fraction 
- Simplifying a fraction 








### ***Plotting and Ordering Fractions*** (3 Topics)

- Fractional position on a number line 
- Ordering fractions with the same denominator 
- Ordering fractions with the same numerator 

### ***Multiplication and Division*** (10 Topics)





- Product of a unit fraction and a whole number 
- Product of a fraction and a whole number: Problem type 1 
- Introduction to fraction multiplication 
- Fraction multiplication 
- Signed fraction multiplication: Basic 
- Word problem involving fractions and multiplication 
- Multi-step word problem involving fractions and multiplication 
- The reciprocal of a number 
- Division involving a whole number and a fraction 
- Fraction division 

### ***Addition and Subtraction*** (7 Topics)





- Addition or subtraction of fractions with the same denominator 
- Finding the LCD of two fractions 
- Addition or subtraction of unit fractions 
- Introduction to addition or subtraction of fractions with different denominators 
- Addition or subtraction of fractions with different denominators 
- Word problem involving addition or subtraction of fractions with different denominators 
- Fractional part of a circle 

### ***Mixed Numbers*** (5 Topics)



- Writing a mixed number and an improper fraction for a shaded region 

- Writing an improper fraction as a mixed number 
- Writing a mixed number as an improper fraction 
- Addition or subtraction of mixed numbers with the same denominator 
- Mixed number subtraction with the same denominator and renaming 

#### ***Exponents and Order of Operations*** (4 Topics)

- Exponents and fractions 
- Exponents and signed fractions 
- Order of operations with fractions: Problem type 1 
- Complex fraction without variables: Problem type 1 






#### ***Equations and Applications*** (2 Topics)

- Multiplicative property of equality with fractions 
- Solving a fraction word problem using a linear equation of the form  $Ax = B$  




### **Decimals** (30 Topics)

---




#### ***Place Value, Ordering, and Rounding*** (6 Topics)

- Writing a decimal and a fraction for a shaded region 
- Decimal place value: Tenths and hundredths 
- Decimal place value: Hundreds to ten thousandths 
- Introduction to ordering decimals
- Ordering decimals 
- Rounding decimals 




#### ***Addition and Subtraction*** (3 Topics)

- Word problem with addition or subtraction of 2 decimals 
- Word problem with addition of 3 or 4 decimals and whole numbers 
- Word problem with subtraction of a whole number and a decimal: Regrouping with zeros 







#### ***Multiplication*** (3 Topics)

- Multiplication of a decimal by a power of ten 
- Word problem with multiplication of a decimal and a whole number 
- Word problem with decimal addition and multiplication 





#### ***Division*** (3 Topics)

- Division of a decimal by a power of ten 
- Word problem with division of a decimal and a whole number 
- Word problem with decimal subtraction and division 

#### ***Converting Fractions to Decimals*** (6 Topics)





- Converting a fraction with a denominator of 10 or 100 to a decimal 
- Converting a fraction with a denominator of 100 or 1000 to a decimal 
- Converting a fraction to a terminating decimal: Basic 
- Converting a fraction to a repeating decimal: Basic 
- Converting a fraction to a repeating decimal: Advanced 
- Converting a mixed number to a terminating decimal: Basic 

#### ***Equations and Applications*** (4 Topics)

- Additive property of equality with decimals 
- Multiplicative property of equality with decimals 
- Solving a two-step equation with signed decimals 
- Solving a decimal word problem using a linear equation of the form  $Ax + B = C$  

#### ***Square Roots*** (5 Topics)







- Square root of a perfect square 

- Using a calculator to approximate a square root 
- Estimating a square root 
- Square root of a rational perfect square 
- Simplifying the square root of a whole number less than 100 






## Ratios, Proportions, and Percents (32 Topics)

---








### *Ratios and Rates* (6 Topics)

- Writing ratios for real-world situations 
- Finding a unit price 
- Computing unit prices to find the better buy 
- Solving a word problem on proportions using a unit rate 
- Solving a one-step word problem using the formula  $d = rt$  
- Word problem on unit rates associated with ratios of whole numbers: Decimal answers 















### *Proportions* (5 Topics)

- Solving a proportion of the form  $x/a = b/c$  
- Word problem on proportions: Problem type 1 
- Word problem on proportions: Problem type 2 
- Word problem on mixed number proportions 
- Word problem with powers of ten 

### *Converting Between Fractions, Decimals, and Percentages* (7 Topics)

- Converting a fraction with a denominator of 100 to a percentage 
- Converting a percentage to a fraction with a denominator of 100 
- Finding the percentage of a grid that is shaded 
- Introduction to converting a percentage to a decimal 
- Converting between percentages and decimals 
- Converting a percentage to a fraction in simplest form 
- Converting a fraction to a percentage: Denominator of 20, 25, or 50 





### *Applications Involving Percentages* (14 Topics)

- Finding a percentage of a whole number 
- Applying the percent equation: Problem type 1 
- Applying the percent equation: Problem type 2 
- Finding a percentage of a total amount: Real-world situations 
- Writing a ratio as a percentage without a calculator 
- Computing a percentage from a table of values 
- Finding the rate of a tax or commission 
- Finding the sale price without a calculator given the original price and percent discount 
- Finding the total cost including tax or markup 
- Finding the original price given the sale price and percent discount 
- Finding the percentage increase or decrease: Advanced 
- Finding simple interest without a calculator 
- Introduction to compound interest 
- Finding the final amount in a word problem on compound interest 

## Geometry (45 Topics)









---

### *Perimeter* (5 Topics)

- Perimeter of a polygon 
- Perimeter of a square or a rectangle 
- Sides of polygons having the same perimeter 
- Finding the missing length in a figure 

- Perimeter of a piecewise rectangular figure 











### ***Lines, Angles, and Triangles*** (9 Topics)

- Identifying parallel and perpendicular lines 
- Naming segments, rays, and lines
- Acute, obtuse, and right angles 
- Solving equations involving vertical angles 
- Solving equations involving angles and a pair of parallel lines 
- Acute, obtuse, and right triangles 
- Classifying scalene, isosceles, and equilateral triangles by side lengths or angles 
- Finding an angle measure of a triangle given two angles 
- Finding an angle measure for a triangle with an extended side 









### ***Polygons and Quadrilaterals*** (1 Topic)

- Interpreting a Venn diagram of 2 sets 



### ***Area of Polygons*** (10 Topics)

- Area of a square or a rectangle 
- Perimeter and area on a grid 
- Distinguishing between the area and perimeter of a rectangle 
- Areas of rectangles with the same perimeter 
- Finding the side length of a rectangle given its perimeter or area 
- Finding the perimeter or area of a rectangle given one of these values 
- Area of a piecewise rectangular figure 
- Word problem involving the area between two rectangles 
- Area of a triangle 
- Area involving rectangles and triangles 




### ***Circumference and Area of Circles*** (8 Topics)

- Introduction to a circle: Diameter, radius, and chord 
- Circumference of a circle 
- Finding the radius or the diameter of a circle given its circumference 
- Circumference ratios 
- Perimeter involving rectangles and circles 
- Circumference and area of a circle 
- Area involving rectangles and circles 
- Word problem involving the area between two concentric circles 




### ***Volumes*** (2 Topics)

- Volume of a rectangular prism made of unit cubes 
- Volume of a rectangular prism 

### ***Surface Areas*** (3 Topics)



- Surface area of a cube or a rectangular prism 
- Surface area of a triangular prism 
- Surface area of a cylinder 

### ***Pythagorean Theorem*** (3 Topics)

- Introduction to the Pythagorean Theorem 
- Pythagorean Theorem 
- Word problem involving the Pythagorean Theorem 

### ***Congruent and Similar Figures*** (4 Topics)







- Identifying similar or congruent shapes on a grid
- Similar polygons 

- Similar right triangles 
- Indirect measurement 







## Measurement (17 Topics)

---





### *U.S. Customary Units of Measurement* (6 Topics)

- Choosing U.S. Customary measurement units 
- U.S. Customary unit conversion with whole number values 
- Conversions involving measurements in feet and inches 
- Adding measurements in feet and inches 
- U.S. Customary unit conversion with whole number values: Two-step conversion 
- U.S. Customary area unit conversion with whole number values 

### *Metric Units of Measurement* (6 Topics)

- Choosing metric measurement units 
- Metric distance conversion with whole number values 
- Metric mass or volume conversion with whole number values 
- Metric distance conversion with decimal values 
- Metric conversion with decimal values: Two-step problem 
- Metric area unit conversion with decimal values 

### *Time and Temperature* (4 Topics)

- Time unit conversion with whole number values 
- Adding time 
- Elapsed time 
- Converting between temperatures in Fahrenheit and Celsius 








### *Converting Between Measurement Systems* (1 Topic)

- Converting between metric and U.S. Customary unit systems 








## Statistics and Probability (28 Topics)

---




### *Tables and Graphs of Data* (12 Topics)

- Interpreting a tally table 
- Constructing a bar graph for non-numerical data
- Constructing a histogram for numerical data
- Interpreting a bar graph
- Interpreting a double bar graph
- Interpreting a pictograph table 
- Interpreting a line graph 
- Interpreting a circle graph or pie chart
- Finding a percentage of a total amount in a circle graph 
- Computations from a circle graph 
- Angle measure in a circle graph 
- Finding if a question can be answered by the data 






### *Mean, Median, and Mode* (7 Topics)

- Mode of a data set 
- Mean of a data set 
- Mean and median of a data set 
- Finding the value for a new score that will yield a given mean 
- How changing a value affects the mean and median 
- Choosing the best measure to describe data 
- Rejecting unreasonable claims based on average statistics 

### Counting (3 Topics)

- Interpreting a Venn diagram of 3 sets 
- Introduction to the counting principle 
- Counting principle 




### Probability (6 Topics)

- Introduction to the probability of an event 
- Probability of an event 
- Understanding likelihood 
- Odds of an event
- Outcomes and event probability 
- Introduction to expectation 










## Graphs of Linear Equations (21 Topics)

---








### Ordered Pairs (3 Topics)

- Reading a point in the coordinate plane 
- Plotting a point in the coordinate plane 
- Table for a linear equation 

### Graphing and Intercepts (10 Topics)

- Graphing a linear equation of the form  $y = mx$  
- Graphing a line given its equation in slope-intercept form: Integer slope 
- Graphing a line given its equation in slope-intercept form: Fractional slope 
- Graphing a line given its equation in standard form 
- Graphing a vertical or horizontal line 
- Finding x- and y-intercepts given the graph of a line on a grid 
- Finding x- and y-intercepts of a line given the equation: Basic 
- Graphing a line given its x- and y-intercepts 
- Graphing a line by first finding its x- and y-intercepts 
- Graphing a parabola of the form  $y = ax^2$




### Slope (8 Topics)

- Classifying slopes given graphs of lines 
- Finding slope given the graph of a line on a grid 
- Finding slope given two points on the line 
- Finding the slope of horizontal and vertical lines 
- Finding the coordinate that yields a given slope 
- Graphing a line given its slope and y-intercept 
- Graphing a line through a given point with a given slope 
- Writing an equation and drawing its graph to model a real-world situation: Advanced





## Exponents and Polynomials (36 Topics)

---






### Polynomial Addition and Subtraction (3 Topics)

- Degree and leading coefficient of a univariate polynomial 
- Simplifying a sum or difference of two univariate polynomials 
- Simplifying a sum or difference of multivariate polynomials 









### Product and Power Rules of Exponents (9 Topics)

- Understanding the product rule of exponents 
- Introduction to the product rule of exponents 
- Product rule with positive exponents: Univariate 
- Product rule with positive exponents: Multivariate 







- Understanding the power rules of exponents 
- Introduction to the power of a power rule of exponents 
- Introduction to the power of a product rule of exponents 
- Power rules with positive exponents: Multivariate products 
- Power and product rules with positive exponents 








#### ***Polynomial Multiplication*** (8 Topics)

- Multiplying a univariate polynomial by a monomial with a positive coefficient 
- Multiplying a multivariate polynomial by a monomial 
- Multiplying binomials with leading coefficients of 1 
- Multiplying binomials with leading coefficients greater than 1 
- Multiplying binomials in two variables 
- Multiplying conjugate binomials: Univariate 
- Squaring a binomial: Univariate 
- Multiplication involving binomials and trinomials in one variable 






#### ***Factoring Polynomials*** (4 Topics)

- Introduction to the GCF of two monomials 
- Greatest common factor of two multivariate monomials 
- Factoring out a monomial from a polynomial: Univariate 
- Factoring out a monomial from a polynomial: Multivariate 

#### ***Quotient Rule and Negative Exponents*** (7 Topics)

- Introduction to the quotient rule of exponents 
- Simplifying a ratio of univariate monomials 
- Quotient of expressions involving exponents 
- Evaluating expressions with exponents of zero 
- Evaluating an expression with a negative exponent: Whole number base 
- Power of 10: Negative exponent 
- Evaluating an expression with a negative exponent: Positive fraction base 







#### ***Scientific Notation*** (5 Topics)

- Scientific notation with positive exponent 
- Scientific notation with negative exponent 
- Converting between scientific notation and standard form in a real-world situation 
- Multiplying numbers written in scientific notation: Basic 
- Dividing numbers written in scientific notation: Basic 






### **Inequalities** (12 Topics)

---

#### ***Writing and Graphing Inequalities*** (6 Topics)

- Translating a sentence by using an inequality symbol 
- Graphing a linear inequality on the number line 
- Writing an inequality given a graph on the number line 
- Translating a sentence into a one-step inequality 
- Translating a sentence into a multi-step inequality 
- Writing an inequality for a real-world situation 

#### ***Linear Inequalities*** (6 Topics)

- Identifying solutions to a two-step linear inequality in one variable 
- Additive property of inequality with whole numbers 
- Additive property of inequality with integers 
- Multiplicative property of inequality with integers 
- Solving a two-step linear inequality: Problem type 1 

- Solving a two-step linear inequality: Problem type 2 