Section 2.1

- Translation from English to math expression
  - Know words for operators
  - Define variables
- Evaluation of an algebraic expression
  - Basic order of operations knowledge
- Using a "T-table" to describe a real world scenario
  - Find values based on a given scenario & place in a table
  - See a pattern & express with an algebraic expression
  - Draw a scattergram & give a create a linear model (connection to §1.2)

Section 2.2

- Meaning of a fraction
  - Picture to fraction & vice versa
  - Proper vs. Improper Fractions
    - ✓ Mixed # for improper & back
- Prime Factorization of a Number
  - Prime # vs. Composite #
  - Using Exponential Notation to write prime factorization
  - Written as a product ALWAYS
- Reduce a Fraction
  - Using Prime Factorization
    Must know which by words
  - Using Greatest Common Factor
    - ✓ Must know which by words
- Building a Higher Term
  - Use of Fundamental Theorem of Fractions
  - Equivalent Fraction
- Multiplying Fractions & Mixed Numbers
  - Mixed #'s must be improper fractions 1st
  - Cancel 1st to reduce work in end
  - Simplify by reducing **and/or** changing to mixed # when needed
- Dividing Fractions & Mixed Numbers
  - Mixed #'s must be improper fractions 1st
  - Multiply by a reciprocal
    - ✓ Definition of a reciprocal as multiplicative inverse
    - ✓ Ways to find inverse: whole #, fraction, mixed #
- Adding/Subtract Fractions & Mixed #'s with Like Denominators
  - Add/Subtract and only then can you simplify
  - Mixed #'s can be done 2 ways
    - ✓ w/ columnar method borrowing & carrying is a place to pay attention
- Finding a Least Common Denominator (LCD)
  - Using prime factorization
  - Not the LCD and I will take points off
  - This isn't a guess & check method – must know mathematically rigorous method for me
- Adding/Subtracting Fractions & Mixed #'s with Unlike Denominators
  - Find LCD first (showing work)
  - Build higher terms (showing work)
  - For remainder of process see add/subt w/ like denominators
- Zero & Division

Section 2.2 con'd

  - Division by zero is undefined
  - Dividing zero by any # results in zero
- Identity Element for Multiplication – One
  - Anything times 1 yields the thing – $a \bullet 1 = a$
  - Divide anything by one and it yields the thing – $a \div 1 = a$
- Inverse Property of Multiplication
  - Any number multiplied by its reciprocal is 1 (said another way # ÷ self = 1) – $a \div a = 1$

Section 2.3

- Absolute Values
- Opposites
- Combining Absolute Values & Opposites
- Adding Real Numbers
  - ✓ Integers
  - ✓ Fractions (Without a calculator)
  - ✓ Decimals (Pay close attention to subtraction)
- Evaluation w/ Real Numbers
- Translation
- Completing Tables of Values from a story

Section 2.4

- Subtraction changed to Addition of an Opposite
  - ✓ More Addition of Real Numbers
- Change in a Quantity Problems
  - ✓ Change = End Amount – Beginning Amount
    - Positive Change means increasing quantities
    - Negative Change means decreasing quantities

Section 2.5

- Writing Equivalent Forms
  - ✓ Decimals, Fractions & Percents
- Percent of a Quantity as Multiplication Problems
- Multiplying & Dividing Real Numbers
  - ✓ Integers
  - ✓ Fractions (Without a Calculator)
    - Negative Fractions ("–numerator" vs "–denominator" vs "–fraction" – all the same)
  - ✓ Decimals
    - Dividing by a decimal
    - 3 Types of decimal answers
      - Terminating Decimal
      - Non-Terminating Repeating Decimal
      - Not sure (you just can't see the repeat) – I usually ask you to round this type
        - ➢ Rounding
- Ratios
  - ✓ Simplified as a fraction
  - ✓ One whole # to another

Section 2.6

- Exponents
  - ✓ Fractions
  - ✓ Negative number raised to a power vs The Opposite of a Number Raised to a power
    - $a^n \neq (-a)^n$ when n is even
- Order of Operations
  - ✓ PEMDAS
    - Multiply/Divide before Add/Subtract
      - In left to right order for MD & AS
  - ✓ Exponents don't distribute over Parentheses
    - Do parentheses 1st then exponent PE in PEMDAS
  - ✓ Friendly Reminder Division by Zero is Undefined!!

Section 2.6 con'd

- Don't confuse with zero divided by anything which is zero

- Table of Values showing Constant Increase/Decrease over 1 Unit Increments

Section 3.1

- Linear Equation in 2 Variables – Slope-Intercept Form
  - $y = mx + b$ where m = slope & b = y-intercept ➔ (0, b)
  - ✓ Solutions are ordered pairs (x, y)
  - ✓ Infinite solutions
    - Every x will be a part of a solution at some point & so will every y (for non-vertical & horizontal lines)
- Finding the y-intercept
  - ✓ Read the constant in the equation
- Check if an ordered pair is a solution to a linear equation (Satisfies a linear equation)
- Finding Solutions to A Linear Equation from a Graph

Section 3.2

- Linear Models based on slope and y-intercept
  - Dependent = y-intercept + Slope • Independent
- Unit Analysis of Linear Model
  - Units of the dependent are repeated in the y-intercept & numerator of the slope
  - Units of Independent cancel with units in denominator of slope
  - Units of y-intercept + slope• indep. are same as dependent units
- Graphing Linear Equations
  - Non-horizontal & vertical
  - Special Characteristics of Horizontal Lines
    - ✓ All ordered pairs have same y
    - ✓ Slope is zero
    - ✓ Equation is y = b
    - ✓ Graph is a line like the horizon
- Special Characteristics of Vertical Lines
  - All ordered pairs have same x
  - Slope is undefined
  - Equation is x = a
  - Graph is a line that is straight up & down

Section 3.3

- Slope of a Line (abbreviated as "m")
  - Steepness of a line – comparing as unit ratios (larger is steeper)
- Slope in General Sense
  - Positive vs Negative – Climb Up vs Slide Down viewed left to right
- 3 Ways to Find Slope
  - Slope Formula $m = \frac{y_2 - y_1}{x_2 - x_1}$
  - Visual/Geometric $m = {}^{rise}/_{run}$
  - Equation $y = mx + b$ where m = slope
- Slopes of Vertical & Horizontal Lines
  - See above

Section 3.4

- Graphing with y-intercept & slope
  - Graph y-intercept (label w/ ordered pair)
  - Use slope as a "map" to get 2 more unique solutions (label w/ ordered pairs)

Section 3.4 con'd

  - Draw line through 3 points (always 3) & put arrows on ends (always)
  - Label with the Linear Equation (name the line)
- Finding a Linear Equation
  - Given the y-intercept & slope
    - ✓ Plug in to $y = mx + b$
- Parallel Lines?
  - Based on the slope & y-intercept
    - ✓ Slopes are equal
    - ✓ Y-intercepts are different
  - Horizontal & Horizontal or Vertical & Vertical are always parallel
    - ✓ Still can't be same line though – eg x = 4 & x = 4 are not parallel they are the same
- Perpendicular Lines?
  - Based only on slope
    - ✓ Negative Reciprocals of One Another
      - Take the opposite of one and then take the reciprocal & it should be the other if perp.
      - $m_1 \cdot m_2 = -1$ means they are negative reciprocals
  - Horizontal & Vertical lines are always perpendicular

Section 3.5

- Rate of Change
  - Change in dependent to Change in independent
    - ✓ Difference quotient
    - ✓ In a Linear Equation it is called the Slope
      - Rate of Change is Constant in ANY Linear Eq.
- Is a Model a Linear Equation?
  - From a table of values
  - Look for Constant Rate of Change
- Revisit Models & Unit Analysis
  - Emphasized: Dependent = Baseline + Rate of Change • Independent
    - ✓ Unit analysis can help in identifying each quantity
    - ✓ Dependent changes based on something (many times years passing)
    - ✓ Independent is the item being called out as the item affecting a change
    - ✓ Baseline is a starting point for the values of the dependent (has units of dependent)
    - ✓ Rate of change has dependent units per independent units

To study for this test you should know to what each of these concepts refers. If you don't know use your notes (remember that Word documents are searchable) and the index of the book to find out. From there you should find examples and/or exercises that exhibit the concept and make sure that you understood how to do those type problems. Spend the majority of your study time on what you don't understand, making your ***5x8 notecard*** *as you study those concepts that you don't know. Remember that your 5x8 notecard may have step-through-processes and formulas but may not have definitions and examples. You* ***will not be allowed the use of a calculator*** *for this exam.*