Math 7 Study Guide

Final Exam

**Chapter 4**

Section 4.1: Factors and Prime Factorization

* Prime number: only factors are 1 and itself
* Composite number: has more factors than just 1 and itself
* Prime factorization: when you write a number as the product of its prime factors
	+ Use a factor tree to do this
* Factoring a monomial
	+ Factor the number first then factor the variables

Section 4.2: Greatest Common Factor

* Common factor: a whole number that is a factor of two or more nonzero whole numbers
* Greatest common factor: the greatest (largest value) of the common factors shared between two or more numbers
* Relatively prime: two numbers are relatively prime if their greatest common factor is 1
* Know how to find the greatest common factors of monomials
	+ Find greatest common factor of the number part of monomial
	+ Greatest amount of variables that are in both numbers
	+ Ex. 24xy2 and 48x2y: GCF=24xy because only 1 x and 1 y in common for both numbers

Section 4.3: Equivalent Fractions

* Two fractions that represent the same number are called equivalent fractions
	+ Multiply the top and bottom of a fraction by the same number to produce an equivalent fraction
* Writing a fraction in simplest form
	+ Take out the common factors of numerator and denominator (may take multiple steps but can be done this way)….or….
	+ Divide by the greatest common factor of numerator and denominator for a one step to simplest form
* Simplify a variable expression fraction
	+ Do same process for the numbers and then cancel out all the variables that appear in the numerator and denominator of the fraction

Section 4.4: Least Common Multiple

* A multiple of a whole number is the product of the number and any nonzero number
* Common multiple: a multiple that is shared by two or more numbers
* The least common multiple: smallest of the common multiples shared by two or more numbers
* Using the Least common multiple to compare fractions and their value

Section 4.5: Rules of Exponents

* When multiplying powers with the same base: add the exponents
* When dividing powers with the same base: subtract the exponents
* When using both at once: multiply all powers (add their exponents) then divide the powers (subtract the exponents)

Section 4.6: Negative and Zero Exponents

* For any nonzero number, a number with 0 as the exponent will always equal 1
* For any number raised to a negative power, the number is changed to a fraction of 1 over the number raised to the positive power.
	+ Ex. 5-5 = 1/55
* Know how to express negative exponents as positive exponents (see point above)
* Know how to get rid of fraction bars
	+ If positive exponent is on the bottom of a fraction, to get rid of fraction bring the power to the top by changing the exponent to negative instead of positive

Section 4.7: Scientific Notation

* Know how to write numbers in scientific notation
* Use for really big numbers and really small numbers
* When writing a really small decimal it will have a negative exponent
	+ 5 x 10-5 = 0.00005
* When writing a really big number it will have a positive exponent
	+ 5 x 105 = 500,000

**Chapter 5**

Section 5.1: Rational Numbers

* A rational number is a number that can be written as a quotient of two integers
* In a terminating decimal, the division ends because you obtain a final remainder of zero
* In a repeating decimal, a digit or block of digits in the quotient repeats forever

Section 5.2: Adding and Subtracting like Fractions

* So long as the **denominators are the same**, we can add or subtract the numerators in two or more fractions.
* Make sure you always simplify fractions after adding or subtracting them.

Section 5.3: Adding and Subtracting unlike Fractions

* Need to create a common denominator between the fractions.
* Find LCD and turn both fractions into a fraction that has the LCD as the denominator.
* Now the fractions are **like fractions** and we can add or subtract them.
* Simplify when done
* **If you end with an improper fraction, turn it into a Mixed number**

Section 5.4: Multiplying Fractions

* When multiplying fractions, multiply the numerators to get final numerator and then multiply denominators to get final denominator. Ex. $\frac{2}{3} x \frac{3}{4}=\frac{2x3}{3x4}=\frac{6}{12}=\frac{1}{2}$
* Remember to simplify the final answer.
* You can also butterfly and use that to simplify before doing the multiplication.
	+ In the above example you could have taken a 3 out of each fraction and a 2 out of each fraction and you would have ended up with the same answer

Section 5.5: Dividing Fractions

* To divide fractions, multiply by the inverse of the second fraction ex. $\frac{2}{3} ÷ \frac{3}{4}=\frac{2}{3}×\frac{4}{3}=\frac{8}{9}$
* If you have a problem that has a mixed number turn it into an improper fraction for multiplying or dividing

Section 5.6: Using Multiplicative Inverses to Solve Equations

* The product of a number and its multiplicative inverse is 1. $\frac{2}{3} x \frac{3}{2}=\frac{6}{6}=1$
* The inverse of a fraction is just the original fraction flipped over.
* We use this for when a fraction is paired with a variable, once multiplied by the inverse, the variable is now by itself.

Section 5.7: Equations and Inequalities with Rational Numbers

* If you multiply the whole equation by the LCD of the fractions it will create an equation with whole numbers instead of fractions.
* We use this method to “clear the fractions”
* Remember to make sure the variable is on a side of the equation by itself before you multiply or divide to get variable truly by itself with no number in front of it
* **Remember when you multiply or divide by a negative number when it is an inequality to flip the sign.**

Use Pages 264-267 to review. Use Pages 268-269 for extra problems if desired.

**Chapter 8**

Section 8.1: Relations and Functions

* A **relation** is a pairing of numbers in one set, called the **domain**, with numbers in another set, called the **range**
* Each number in the **domain** is an **input** and each number in the **range** is an **output.**
* When a relation is represented by ordered pairs, (a, b), then the first number, a, is the input and the x-coordinate and is a part of the domain. The second number, b, is the output and is the y-coordinate and is part of the range.
* A relation is a **function** if for each input there is *exactly one* output. In this case, the output is a function of the input.
* When a relation is represented by a graph, you can use the vertical line test to tell whether the relation is a function. The **Vertical line test** says that if you can find a vertical line passing through more than one point of the graph, then the relation **is not** a function. Otherwise, the relation **is** a function.
* Know how to use a **table** and a **mapping diagr**am to show a relation

Problems for practice: Pages 403-404 #’s 3, 4, 8-12, 18-20

Section 8.2: Linear Equations in Two Variables

* An example of **an equation in two variables** is 2x – y = 5.
* A **Solution** of an equation in x and y is an ordered pair (x, y) that produces a true statement when the values of x and y are substituted into the equation.
	+ A solution to 2x – y = 5 could be (3, 1) because when substituted in you get 2(3) – 1 = 5 which leads to 6 – 1 = 5 and then we get 5 = 5 which is a true statement so the ordered pair (3, 1) is a solution to the two variable equation of 2x – y = 5
* The **graph** of an equation in two variables is the set of points in a coordinate plane that represent all the solutions of the equation.
	+ Note: we usually do not need any more than 5 points to create the graph of the equation
* An equation whose graph is a line is called a **linear equation**
* The graph of an equation where y = 2 or y = -2; so an equation with just the y variable is a horizontal line through the point that y equals.
* The graph of an equation where x = 3 or x = -4; so an equation with just the x variable, is a vertical line through the point that x equals.
* When the two variable equation is solved for y, meaning that y is the only variable on the left side, then the equation is now in **function form**.
	+ Y= 2x + 6 – function form
	+ Y = 3x + 5 – function form
	+ 6Y = 3x – 4 – not function form because y is not by itself
* When graphing an equation in function form we want to always plug in a couple of numbers into x and see what the y value is to build our table of coordinates that we can then graph and draw a line through

Problems for practice: Pages 410 – 411 #’s 7 – 10, 12 – 18, 35-39.

Section 8.3: Using Intercepts

* You can graph a linear equation quickly by recognizing that only two points are needed to draw a line. Usually we will pick the two points that cross the x and y – axis
* The x-coordinate of a point where a graph crosses the x-axis is called a **x-intercept**
* The y-coordinate of a point where a graph crosses the y-axis is called a **y-intercept**
* To find the x and y intercepts do the following:
	+ To find the **x-intercept** of a line, substitute 0 for y in the line’s equation and solve for x
		- The coordinates of the **x-intercept** will always have a 0 for the y value: (2, 0) or (-3, 0)
	+ To find the **y-intercept** of a line, substitute 0 for x in the line’s equation and solve for y
		- The coordinates of the **y-intercept** will always have a 0 for the x value: (0,3) or (0, -5)
* Now with these two points we can draw a line between them and so now we don’t have to test a bunch of random numbers and make a table!

Problems for practice: Pages 416-417 #’s 3-8, 10-18

8.4: The Slope of a Line

* Slope = $\frac{rise}{run}$
* Given two coordinate points (X1, Y1) and (X2, Y2) the slope can be calculated using the differences. Slope = $\frac{Y\_{2}-Y\_{1}}{X\_{2}-X\_{1}}$
* If there is a horizontal line, the **slope = 0**
* If there is a vertical line, **the slope is undefined**
* A positive slope moves upwards from left to right
* A negative slope moves downwards from left to right

8.5: Slope-Intercept Form

* A linear equation of the form y = mx + b is said to be in **slope-intercept** form. The slope of the line is the value **m** and the y-intercept is **b** or (0, **b**)
* Example: y=2x + 3; slope of the line = 2 and the y-intercept would be (0, 3)
* Know how to take an equation in standard form 4x + 2y = 8 and turn it into slope–intercept form y = -2x + 4