PRE-ALGEBRA

Notes about Month 5

CH. 6 (Sections 5 through 9)
AND CH. 7 (Sections 1 through 5)
AND REVIEW FROM PRIOR CHAPTERS

I've made up these notes to supplement your work and study this month, especially since there's **no retake test allowed this month**. These notes do not in any way replace your own work and study (and these are NOT the notes that you can turn in for extra credit—see the guidebook for information on how to correctly make those notes). These are important points and hints that can help you avoid some of the common mistakes that students tend to make in these sections.

If the following pages seem too complicated or overwhelming, you don't have to use them. This is just an attempt on my part to provide you with another type of support, since I can't provide daily instruction. Some of what I wrote here is what I would teach if I were teaching class every day like in a traditional school, and some things are hints or warnings based on my experiences with students over the past few years. Using this is **totally voluntary** on your part, but remember that everything I have put here is for the purpose of seeing students be more successful, so I highly recommend that you use as much of these pages as possible.

Make sure you have the math skills handouts for this unit:

For sections 6-5, 6-6, and 6-7:
http://members.cox.net/jimgr/6-5,6,7PerDecFrEq.pdf

For section 7-3 (part 1 of the section only):
http://members.cox.net/jimgr/7-3FractionsInEqns.pdf

For reference in doing decimal operations correctly (adding, subtracting, multiplying and dividing decimals):
http://members.cox.net/jimgr/MathSkillsDecimals.pdf

CHAPTER 6, SECTION 5:

FRACTIONS, DECIMALS AND PERCENTS

1. The point of this section is to make you move back and forth between the three things: percents, fractions, and decimals. You need to recognize each type and the method used to change from one thing to the other. The way you start recognizing these is to **memorize** the steps, and that means **practice** doing it so much that it becomes easy. So practice! If you run out of problems to do, go back to the beginning and redo them, and/or ask your teacher for where to find more problems (also see textbook page 715).

2. You should review the following handout: ***http://members.cox.net/jimgr/6-5,6,7PerDecFrEq.pdf***. This handout is meant to summarize what you need to know, and hopefully it shows it a little better than the textbook. I tried to put the basic steps in the handout, so you could see what you need to do in every case. But since you can't use the handout on the test, or when you're older and need to know these things without looking at a resource, you must memorize how to do each change—so practice, memorize, practice, memorize, practice…and then practice some more!

3. The thing that really helps most people get these right is understanding what the things mean. Realize that the three things (percents, decimals, and fractions) are really exactly the same; they just show the same number in a different form. And, the main point of all three is that they are a PART of something.
    a. **Percent** is a part of 100,
    b. **Decimal** is a part of ten, or hundred, or thousand (it depends on how many numbers come after the decimal point),
    c. **Fraction** is a part of a whole (the part is the numerator, and the denominator is the whole that the part comes from).

CHAPTER 6, SECTION 6:

PROPORTIONS AND PERCENTS

1. The handout for this section is the second page of the handout for section 6-5. It simply copies the chart on the bottom of page 307 (because it's an excellent way of looking at setting up percent problems as proportions).
    a. Notice in every case, **the percent is automatically over 100**.
    b. If you don't know the percent, it's your unknown, the x (or n, for the textbook; I prefer to use x), but still over 100.
    c. The word "**of**" always designates the **DENOMINATOR** of the second fraction (it's the total, out of which a part is taken).
    d. The number left over is the **NUMERATOR** (the part that comes out of the total).
    e. ***WARNING:*** Students very commonly put the wrong numbers in the numerator and denominator. Always use the "**of**" to determine the number for the denominator.

2. Notice that the three questions in the chart are EXACTLY the same problem? If you can get comfortable recognizing what you have and what you're missing, you will get very good at doing these problems.
    a. In the first question, you don't know the **percent**,
       but you know the **part** and the **whole** (total).
    b. In the second question, you don't know the **part**,
       but you know the **whole** (total) and the **percent**.
    c. In the third question, you don't know the **whole** (total),
       but you know the **part** and the **percent**.

3. Oh, don't forget that you actually have to solve the proportions! This is why you were taught that last month—reduce if you can, then cross-multiply (and reduce again if you can), then solve the equation for x, and reduce some more if you can.

CHAPTER 6, SECTION 7:

PERCENTS AND EQUATIONS

1. This section is simply another way of doing what you did in section 6. In this section, you can make equations with questions, and then solve the equations.

2. Notice that the three questions in the chart in the handout (and on page 310) are exactly the same as the questions from the 6-6 chart. However, now you go straight to making equations. Here are some hints to help:
    a. The word "**of**" now means multiplication, so put a multiplication symbol.
    b. The word "**is**" means equals, so put an equal sign.
    c. If you're given the actual percent, make it a decimal (just move that decimal point two places to the left!).
    d. The thing you don't know becomes your **variable** (your unknown, the *x* or *n*).
    e. Now **solve**, like equations you've been doing for a few months—but you have to also remember your decimal rules, especially for dividing (the rules are found on the handout available at ***http://members.cox.net/jimgr/MathSkillsDecimals.pdf***).

CHAPTER 6, SECTION 8:

PERCENT OF CHANGE

1. Make a fraction: the amount of the change on top of the original amount.
2. That means that you have to first subtract. This is where many students make a mistake; they just take the numbers in the problem and make a fraction. In all the 6-8 examples, you first have to find the difference (subtract), and then put that difference on top of the original amount.
3. ***WARNING:*** That's the main mistake that students often make: they don't put the original amount as the denominator.
4. Increase or decrease doesn't change the procedure you use, but at the end you should identify that the percent you arrive at is an increase or a decrease.

CHAPTER 6, SECTION 9:

MARKUP AND DISCOUNT

1. The best way to understand this section is in practical terms. If you own a store and you're selling something, you first have to buy it from someone. If you buy it for $10 and then you sell it for the same amount, $10, you haven't made any money, and you can't pay for your store's rent, or pay your employees, or pay your electricity bill, or give yourself a salary either! So stores always mark up prices so they can make a profit. That's part one of section 6-9.
2. To find the **MARKUP** amount: Make an equation with the information you're given. The percent markup must always multiply to the store's cost of the item.
3. The markup amount is NOT the actual price you want a customer to pay for the item. You have to add that markup amount to the store's cost, so a customer is paying the store's cost of the item plus the markup, which allows the store to pay bills and make a profit. ***WARNING:*** Many students forget to add the markup to the store's cost, to get the selling price. Selling price is same as sale price.
4. Part 2 in section 6-9 is about **DISCOUNT**. This is a two-step process.
    a. First, **multiply** the percent discount to the original price. This gives you the discount amount.
    b. Second, **subtract** that discount amount from the original price. Now you have the sale price, and hopefully a real deal, so people will want to buy it! ***WARNING:*** Many students forget to do this subtraction step.

CHAPTER 7, SECTION 1:

SOLVING TWO-STEP EQUATIONS

1. Your whole purpose is to **solve for the variable**. So you have to isolate it—get it all alone on one side of the equation. You've been doing this already, just now you're going to have two steps to do.
    a. **Always do the adding or subtracting first.** The point is that you want the "constant" (the number that's on the same side as the variable, but connected to it by adding or subtracting) to be moved to the other side. You do that by figuring out how to make it zero on the side with the variable, and then do that same action on the other side. Normally that means that you do the opposite operation; if it's addition, you subtract. If it's subtraction, you add.
        Example: $4x + 5 = 29$
        Step One: $4x + 5 - 5 = 29 - 5$
        Simplified: $4x = 24$

    b. **Next do the multiplying or dividing.** Again, you'll do the opposite operation. Since this example shows the coefficient connected to the variable by multiplication, you have to divide by that coefficient. That makes 1, which keeps the variable the same, but removes the coefficient. You also do the same operation on the other side.
        Example: $4x = 24$
        Step Two: $4x/4 = 24/4$
        Simplified: $x = 6$
        Note that I used "/" to signify division. I could have also shown $4x \div 4 = 24 \div 4$. Both ways are fine. You want to understand the different ways that can show the same thing.

    c. The answer is to be in the form, "**x = 6**."

2. The most common errors made by students are with negative signs.
    a. If the coefficient has a negative sign, use that sign with the opposite operation.
        Example: $-4x = 24$
        Step One: $-4x/(-4) = 24/(-4)$
        Simplified: $x = -6$

    b. Do your adding/subtracting correctly when you have negative and positive numbers:
        Example: $3x - 345 = -429$
        Step One: $3x - 345 + 345 = -429 + 345$
        Find the difference of the absolute values: 429 – 345 = 84, but because the larger number was originally negative, then answer must be made negative. So, –429 + 345 = –84
        Simplified: $3x = -84$
        Step Two: $(3x)/3 = -84/3$

CHAPTER 7, SECTION 2:

SOLVING MULTI-STEP EQUATIONS

The problems shown in this section involve doing whatever is necessary to get the variable by itself. Sometimes you have to combine like terms, sometimes you have to use distribution in order to get an equation into a form you recognize.

Examples:

Example 1: **–24 = –12x + 5x – 10**

(Two terms with the variable)

Step One: Combine like terms: –24 = –7x – 10

Step Two: Opposite operation for the constant (the – 10): –24 + 10 = –7x – 10 + 10

Simplified: –14 = –7x

Step Three: Opposite operation for the coefficient: (–14)/(–7) = (–7x)/(–7)

Simplified: x = 2

Example 2: **–4(3x + 7) + 9x = –43**

(Two terms with the variable, but parentheses requiring the distribution property first.)

Step One: Distribute the –4 to the terms inside the parentheses:
–12x – 28 + 9x = –43

Step Two: Combine like terms (the –12x and the 9x): –3x – 28 = –43

Step Three: Opposite operation for the constant (the –28): –3x – 28 + 28= –43 + 28

Simplified: –3x = –15

Step Four: Opposite operation for the coefficient: (–3x)/(–3) = (–15)/(–3)

Simplified: x = 5

CHAPTER 7, SECTION 3:

MULTI-STEP EQUATIONS WITH FRACTIONS AND DECIMALS

PART ONE: *FRACTIONS IN MULTI-STEP EQUATIONS.*

Go to the handout that is available at
http://members.cox.net/jimgr/7-3FractionsInEqns.pdf.

PART TWO: *DECIMALS IN MULTI-STEP EQUATIONS.*

The textbook, page 347, shows two methods of dealing with decimals in equations.

1. **(This is the method I recommend most.)** Treat the decimals just as normal; add, subtract, multiply, and divide as you would in any equation. You just have to make sure you do the decimal part correctly. See the handout at ***http://members.cox.net/jimgr/MathSkillsDecimals.pdf*** to review the rules of decimals**.**

   NOTE: Students should have these rules of decimals totally memorized by now, and be able to do decimal problems quickly, correctly, and without much thinking about them (in other words, almost automatically).

2. As shown in method 2 on page 347, you can get rid of all decimals by multiplying by a factor of ten. All you have to do is figure out what multiple of ten. You decide by the most digits following the decimal point…in the example on page 347, 0.035 has three digits after the decimal point. Therefore, you multiply every term by the factor of ten that has three zeros in it: 1000. By doing that, the decimal point is removed from every number. ***WARNING***: you have to multiply to every term, even if that term doesn't have a decimal point in it.

3. You may choose which method you prefer. You simply have to get the answer right!

CHAPTER 7, SECTION 4:

REASONING STRATEGY: WRITE AN EQUATION

1. Pay close attention to the example on pages 350-351. This problem has an amount that has to be paid for each day, and then a different amount that's paid for each mile driven. The problem tells you two days and the total amount of money, and you have to figure out how many miles were driven. So, you set up an equation, using the information you're given:

Number of days	•	amount per day	+	number of miles	•	amount per mile	=	total amount
2	•	\$29.95	+	x	•	\$0.12	=	\$70.46

Solve: $2 \cdot 29.95 + 0.12x = 70.46$
$59.90 - 59.90 + 0.12x = 70.46 - 59.90$
$(0.12x)/0.12 = (\$10.56)/0.12$

Simplified: $59.90 + 0.12x = 70.46$
Simplified: $0.12x = 10.56$
Simplified: $x = 88$ miles

2. Sometimes you don't have an amount per day, just a one-time fee that has to be paid at the beginning, and only the miles change. That's the kind of problem you'll see on the practice test.

3. Another type of problem you encounter in 7-4 (and on the month test) is:
   Write an equation and solve: Find two consecutive odd integers whose sum is 24.
   a. Know your vocabulary: Consecutive (following one after another in order), odd (can't be divided by two), integer (whole number—not fractions or decimals—including negatives and zero).
   b. One number is x. The next number after it would be like adding 1. Therefore, the next consecutive number is always x + 1. But if you want the next consecutive ODD number, it's two numbers away from the first, so it's adding 2. You need to write the next consecutive odd number as x + 2. Think of it as 3 and 5. Your x is 3, but 5 is x + 2.
   c. So the equation is: **x + (x + 2) = 24**. Solved: 2x + 2 = 24, 2x = 22, x = 11.
   d. If x = 11, you know the second number is x + 2, or 11 + 2, which is 13. Check: 11 + 13 = 24…good.
   e. ***WARNING***: Students sometimes forget to write BOTH numbers in the answer. The question asks you to find TWO numbers.

CHAPTER 7, SECTION 5:

SOLVING EQUATIONS WITH VARIABLES ON BOTH SIDES

1. This section simply extends your skills in solving equations. When you have variables on both sides of an equation, you combine "like" terms like you've done before. You're just going to have to first add or subtract the variable on one side, to make it zero on one side but include it on the other side.

2. You may have to distribute first, like in example 2 on page 356. After distributing, combine the like terms (combine the variables with the variables, and the constants with the constants).