PRE–ALGEBRA

Notes about Month 9 (Chapter 12)

These helpful notes do not replace your own work and study (and these aren't the notes that you can turn in for extra credit—see the guidebook for information on how to correctly make those notes). This is a summary of the main points of each section for this month.

CHAPTER 12, SECTION 1: Frequency Tables and Line Plots

1. Frequency Table
2. Line Plot
3. HINT: A line plot is easier to do, because you mark each response or piece of data separately, and then it's easier to count them for totals. So, if you have to do both a frequency table and a line plot, do the line plot first.

CHAPTER 12, SECTION 2: Box and Whisker Plots

1. Make a "Box-and-Whisker Plot." Use the handout (available on the Pre-Algebra Course Information webpage, from The Math Page).
2. Analyze data in a box-and-whisker plot. Follow example 3 on page 615. This is what you look for when "analyzing" the data:
    a. Highest score (or response, or height, or price, or whatever the data represents),
    b. Lowest,
    c. Range from the median to the farther end on the box ("at least 50% of the points/scores/whatever are within ___ points/scores/whatever of the median),
    d. Median
    e. Type of distribution:
        i. Even distribution is when the median is in the center of the box.
        ii. When the median is not in the center of the box, it is not "even" distribution.

CHAPTER 12, SECTION 3: Using Graphs to Persuade

1. Breaks: Look at example 1 on page 620. Notice how the break in the vertical scale, below the 2.5. This break is saying "there are many numbers between 0 and 2.5 million people." Although that allows you to use a smaller graph, it also misleads people into thinking there's a bigger difference between the two cities' population on this graph. In actuality, they are much closer in population than this graph tries to make you think they are.
2. Size/impressions: Simply spreading out the graph's numbers can mislead people into thinking something different. Look at example 2 on page 621. The data is the same, and even the lists on the sides are the same (no breaks or anything else that could be misleading). However, by spreading out the months on one graph, and cramming them in close together in the other graph, each graph gives people a different impression about the increase in gasoline prices. One graph makes it seem like the increase in price is smooth, not too much at one time. However, the other graph makes it seem like the one month of price increase is huge. You can't really figure out which is wrong—in a way, neither is wrong—but you learn through this that even a nice-looking graph might not give you

CHAPTER 12, SECTION 4: Counting Outcomes and Theoretical Probability

1. Counting Principle (examples 1 and 2, pages 626-627): Just multiply the number of choices of each type of item.
2. Theoretical Probability: Made a fraction: the number of favorable outcomes (the things you want to see) divided by the total number of possible outcomes (which is also called the "sample space").

CHAPTER 12, SECTION 5: Independent and Dependent Events

1. Independent: the first event *does not* affect the second event. P (A and B) = P(A) • P(B). As an example, if you are picking something in the first event, and you put the thing back in, before the second event, then the second event has the same opportunities that the first event had.
2. Dependent: the first event *does* affect the second event. P (A and B) = P(A) • P(B after A). Most of the time, a dependent event is when you pick something in the first event, but you don't put it back. So there are less things to choose from in the second event.

CHAPTER 12, SECTION 6: Permutations and Combinations

1. Permutations: when order is important.
    a. nPr = the number of permutations of n objects chosen r at a time.
    b. ${}_8P_3 = 8 \bullet 7 \bullet 6 = 336$. Note: start with the first number, go as many numbers as the second number.
2. Combinations: when order is NOT important.
    a. nCr = the number of combinations of n objects chosen r at a time.
    b. ${}_8C_3 = ({}_8P_3) / ({}_3P_3) = (8 \bullet 7 \bullet 6) \div (3 \bullet 2 \bullet 1) = 56$.

CHAPTER 12, SECTION 7: Experimental Probability

1. Make a fraction: the number of times an event occurs, divided by the number of times the experiment is done.
2. Another way to think of it: the number of times that you get the result you want, divided by the total number of times you try for it. So if you take 10 tests, and you want an A on every test, but only get an A on 7 tests, you divide the 7 (the results you want) by the 10 (the total number of tries). That's an experimental probability of 7/10, which is .7, or 70%.
3. Note that the answer for experimental probability is a decimal or a percent.

CHAPTER 12, SECTION 8: Random Samples and Surveys

1. This involves proportions. Look at example 2, on page 647.
    a. Notice that one fraction is set up with the sample numbers:
        i. defective sample calculators over ("divided by)
        ii. total sample calculators,
    b. and the other fraction is set up with the total numbers:
        i. x (or n, in this example) as the defective calculators (which you don't know yet, which is what you want to know), over ("divided by)
        ii. the total number of calculators.
    c. Then you solve for the variable, which will give you an estimate of the number of defective calculators that are in the entire total of calculators.
2. Setting up the proportion is really important, because if you don't have the right things in place at the beginning, then you will get an incorrect answer no matter how well you do your calculations.