Name: _____   Date: 5/4/15
PreCalculus   Ms. Wilson

Basic Combinatorics

A salesman for a copy machine company is trying to convince a client to buy his $2000 machine instead of his competitor's $5000 machine. To make his point, he lines up an original document, a copy made by his machine, and a copy made by the more expensive machine on the table and asks 60 office workers to identify which is which. To everyone's surprise, not a single worker identifies all three correctly. The salesman states triumphantly that this proves that all three documents look the same to the naked eye and that therefore the client should buy his company's less expensive machine. What do you think?

        a.) Each worker is essentially being asked to put three documents in the correct order. How many different ways can the documents be ordered?

        b.) Suppose all three documents really do look alike. What fraction of the workers would you expect to get the correct order by chance alone?

        c.) So, what should we conclude if ZERO workers put them in the right order?

1.) There are three roads from town A to town B and four roads from town B to town C. How many different routes are there from A to C by way of B?

2.) How many 9-letter "words" can be formed from the letters of the word LOGARITHM? (Curiously, one such arrangement spells another mathematical word….can you figure it out?)

3.) From among 12 projects under consideration, the mayor must put together a prioritized list of 6 projects to submit to city council for funding. How many such lists can be formed?

4.) How many different license places begin with two digits, followed by two letters and then three digits, if no letters or digits are repeated?

5.) The head of the personnel department interviews eight people for three identical openings. How many different groups of three can be employed?

6.) Professor Indiana Jones gives his class 20 study questions, from which he will select 8 to be answered on the final exam. How many ways can he select the questions?

7.) Luigi sells one size of pizza, but he claims that his selection of toppings allows for "more than 4000 different choices." What is the smallest number of toppings he could offer?

8.) Each NBA basketball team has 12 players on its roster. If each coach chooses 5 starters without regard to position, how many different sets of 10 players can start when two given teams play a game?

9.) How many different answer keys are possible for a 10-question multiple choice test in which each question leads to choice a, b, c, d, or e?

10.) Suppose that a chain letter is sent to five people in the first week of the year. Each of these five people send a copy of the letter to five more people during the second week of the year; third week…fourth week….etc. Assume that everyone who receives a letter participates. Explain how you know with certainty that someone will receive a second copy of this letter later in the year.