Name _____

Exponents and Factorials

Lecture 5

Simplify the following and express the final answer with positive exponents.

2. $\frac{2^{10}}{4^3}$

4. $\left(\frac{3a^2}{b^3}\right)^2 \left(\frac{-2a}{3b}\right)^2$

8. $2^{x} + 2^{x+1} + 2^{x+2}$

6. $\frac{(a+b)^{-2}}{(a+b)^{-8}}$

1. $\frac{2^{3} \cdot 3^{4} \cdot 4^{5}}{2^{2} \cdot 3^{3} \cdot 4^{4}}$ 3. $(x^{-3})^{2}$ 5. $\frac{3a^{-3}b^{5}}{2a^{2}b^{2}}$ 7. $\left(\frac{2}{3}\right)^{0} + \left(\frac{2}{3}\right)^{1}$ 9. $\left(\frac{m^{2n+6}n^{3n-5}p^{n+2}}{m^{2n-2}n^{3n+5}p^{2-n}}\right)^{3}$

Solve the following for the unknown

10.
$$\frac{(n+1)!}{n!} = 30$$
11. $\frac{(n+2)!}{n!} = 30$ 12. $3^{x} \cdot 3^{2} = 3^{5}$ 13. $2^{x} \cdot 2^{2} = 256$ 14. $\frac{5^{x-3}}{5^{-3}} = 25$ 15. $4^{x^{2}} \cdot 4^{9} = 16^{4}$

Name _____

Permutations/Counting Principle

Lecture 6

1. In how many different orders can 9 people stand in a line?

2. In how many different ways can you answer 10 true-false questions?

3. In how many different ways can you answer 10 multiple choice questions if each question has 5 choices?

4. Many radio stations have 4 letter call signs beginning with k. How many such call signs are possible if a) letters can be repeated? b) letters cannot be repeated?

5. How many 3 digit numbers can be formed using the digits 4, 5, 6, 7, 8 if a) the digits can be repeated? b) the digits cannot be repeated?

6. In how many ways can 4 people be seated in a row of 12 chairs?

7. How many 3 digit numbers contain no 7's?

8. How many 3 digit numbers contain at least one 7?

9. If you have 5 signal flags and can send messages by hoisting one or more flags on a flagpole, how many messages can you send? (yes, order matters)

10. Telephone numbers in the US and Canada have 10 digits as follows:

3 digit area code (first digit is not 0 or 1; second digit must be 0 or 1)

3 digit exchange number (first and second digits are not 0 or 1)

4 digit line number (not all zeroes)

a) How many possible area codes are there?

b) The area code for Chicago is 312. Within this area code, how many exchange numbers are possible?

c) One of the exchange numbers for Chicago is 472. Within this exchange, how many line numbers are possible?

d) How many 7 digit phone numbers are possible in the 312 area code?

e) How many 10- digit phone numbers are possible in the US and Canada?

11. How many 9 letter "words" can be formed using the letters of the word FISHERMAN? How many 9 letter words begin and end with a vowel?

12. A school has 677 students. Explain why at least two students must have the same pair of initials.

Name

Combinations

Lecture 7

1. In how many ways can a club with 13 members choose 4 different officers?

2. In how many ways can a club with 13 members choose a 4 person governing council?

3. In How many different ways can six people be split up into two teams of three each?

4. A teacher has a collection of 20 true-false questions and wishes to choose 5 of them for a quiz. How many quizzes can be made if the order of the questions is considered a) important? b) unimportant?

5. In how many positions can 6 hockey players be chosen from a group of 12 if the playing positions are a) considered? b) not considered?

6. I have a class of 14. In how many ways can I create a committee of 2 boys and 3 girls if there are 8 boys and 6 girls in the class?

7. From a standard deck of 52 cards, 5 cards are dealt and the order of the cards is unimportant.

- a) How many hands different 5 card hands are there?
- In how many ways can you receive
- b) all face cards?
- c) no face cards?
- d) at least 1 face card?
- e) all 5 cards are the same suit?
- f) four of a kind?
- e) a full house?

8. Each of 10 finalists in a state spelling bee contest receives a prize. The prizes are six \$25 bonds, three \$50 bonds, and one \$100 bond. In how many ways can these prizes be given?

9. The 12 workers in a cafeteria crew rotate among 3 kinds of jobs. In how many ways can the crew be assigned the jobs of 2 cooks, 7 servers and 3 dishwashers?

Binomial Theorem

- 1. Write out the expansion $\left(x^2 + \frac{4}{x^3}\right)^6$
- 2. Write out the coefficients of the expansion $(a^3 3b)^7$
- 3. Find the eleventh term of the expansion of $\left(4x + \frac{1}{2}a\right)^{14}$.
- 4. Find the middle term of the expansion $(x^5 + y^3)^{10}$.
- 5. Find the ninety-ninth term of the expansion $(4a^5 + b^{10})^{98}$.
- 6. Find the term(s) of the expansion $(x + y)^{15}$ with coefficient $\begin{pmatrix} 15\\10 \end{pmatrix}$.
- 7. Find the term of the expansion $(4x^2 y^3)^9$ in which y has an exponent of 12.
- 8. Find the term of the same expansion as #7 in which x has an exponent of 14.

Lecture 8

Name _____