Senior Analysis   Name _____

Review   Lectures 5-8

Simplify the following:

1. $\dfrac{8a^9b^{12}c^{-3}}{12a^3b^{14}c^{10}}$

2. $\dfrac{3^{11}}{81^2}$

3. $2^x + 2^x + 2^x + 5(2^x)$

4. $\left(\dfrac{5a^{-2}b^{12}c^4}{a^{-3}b^3c^{10}}\right)^2 \left(\dfrac{15a}{b^{-3}c^7}\right)^{-2}$

5. $\sqrt[3]{\dfrac{x^{2n}y^{4n+4}}{x^{-n}y^{n-5}}}$

6. $\dfrac{a^2 + 2ab + b^2}{a + b}$

Solve the following for the unknown

7. $\dfrac{(n+1)!}{n!} = 62$

8. $\dfrac{(n+5)!}{(n+3)!} = 56$

9. $9^x \cdot 3^3 = 81$

10. $2^{x+3} \cdot 2^2 = 128$

11. $\dfrac{3^{x+3}}{3^{4-x}} = 27$

12. $4^{x^2} \cdot 4^9 = 16^4$

13. I have a class of 14.
a) In how many ways can the class elect a president and vice president?
b) 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?
c) In how many ways can I make a team of 8 for kick ball (everyone can play every position)?
d) For the team of 8 that I do choose, how many different kicking orders are there?
e) In June I award behavior prizes. I give one Golden Pencil award (1st place), 4 Silver Eraser awards (2nd Place) and 9 Bronze Hole Punch awards (3rd place). In how many ways can these prizes be given?

14. Consider the alphabet:
a) How many 4 letter "words" can be made if no repetitions are allowed?
b) How many 4 letter "words" can be made if repetitions are allowed?
c) How many 4 letter "words" can be made if no 2 sequential letters are the same? (repetitions are allowed)

15. Consider the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9   (repetition allowed)
a) How many 5 digit whole numbers can be formed?
b) How many 5 digit whole numbers divisible by 2 can be formed?
16. My kids DVD collection has 8 Disney movies, 3 Pixar movies and 4 Magic School Bus movies. In how many different ways can I arrange the movies, if I keep the movies together – i.e. the Disney movies stay together, the Pixar stay together, etc.

17. Consider the letters PINGRY
a) How many different ways can the letters be arranged (using each letter only once)
b) How many arrangements are there if P is at the beginning and Y is at the end?
c) How many arrangements are there if P and I are not next to each other?

18. There are 19 members of a baseball team. How many different ways can the coach field 9 players if each player can play every position?

19. There are 8 possible toppings to choose from at Maude's Ice Cream Emporium. How many possible combinations are there of toppings if you may have as many toppings as you want?

20. A club has 10 members. They wish to split themselves into 2 committees of seven and three members each. In how many different ways can this be done?

21. How many ways can 5 card hands be selected out of a deck of 52 so that all 5 cards are face cards?

22. Find the 5th term of the sequence $(2m^3 + ny^2)^7$

23. Find the middle term of the expansion $\left(3x^5y^7 - \dfrac{1}{3x^3y^2} \right)^{18}$

24. Find the 25th term in the sequence $\left(a + b^6 \right)^{40}$

25. Find the term whose exponent of "a" is 12 in the expansion of $\left(3y + a^4 \right)^{15}$

26. Find the term(s) of the expansion of $\left(a^3 + b^4 \right)^{19}$ that has a coefficient equivalent to $\dbinom{19}{6}$.

27. If the 12th and the 3rd term of the expansion of $(a+b)^n$ have the same coefficient, find the 14th term of the expansion.

28. Find the 8th term of the sequence $(3x - 12)^{12}$

29. Find the middle term of the sequence $\left(a^2b^3 - \dfrac{1}{2c^3} \right)^8$

30. Find the 43rd term in the sequence $\left(12a - b^6 \right)^{43}$

31. Find the term whose exponent of a is 10 in the expansion of $(4x + a^2)^7$

32. Find the term(s) of the expansion of $(a+b^3)^7$ that has (have) a coefficient of $\dbinom{7}{2}$.