Permutations and Combinations
Algebra 2

Calculate.

1) 2!   2) 6!   3) 5!

Write out the following factorials and show the canceling.
4) 8!/6!

5) 10!/8!

6) 9!/5!

Write in terms of factorials.
7) 98 x 97 x 96 =   8) 32 x 31 x 30 x 29 =

9) 50 x 49 x 48 =

10) You take a multiple-choice test. There are 20 questions and each question has 5 answer choices. How many ways can you fill out the answer sheet?

11) A nickel, a dime, a 6 sided die, and a 10 sided die are tossed, how many results are possible?

12) Eight students are participate in a talent show. One student insists on being the grand finale. If his request is granted how many ways can the show be ordered.

Permutations
13) How many ways can your ipod play a playlist of 15 songs on shuffle, if every song gets played before any song gets played twice?

14) You read 25 books last year, and your friend wants you to choose and rank your top 4, how many ways can this be done?

Solve.
15) P(5, 2)   16) P(6, 2)

17) P(7, 6)   18) P(3, 1)

Permutations with repetition
19) List all the possible orderings of the letters T, O, and P.

20) List all the possible orderings of the letters P, O, and P.

21) Explain the relationship between answers 19 and 20.

22) Calculate the number of orderings of the letters W, E, N, and T.

23) Calculate the number of orderings of the letters W, E, E, and E.

24) Calculate the number of orderings of the letters P, E, E, and P.

25) Explain the relationship between the answers to questions 22 and 23.

26) Explain the relationship between the answers to questions 22 and 24.

27) Explain in words how to calculate a permutation with repetition.

28) Calculate the number of orderings of the letters G, R, E, E, and N.

29) Calculate the number of orderings of the letters W, O, O, and D.

30) Calculate the number of orderings of the letters P, A, P, E, and R.

31) Calculate the number of orderings of the letters P, E, P, P, E, and R.

32) Calculate the number of orderings of the letters M, I, S, S, I, S, S, I, P, P, and I.

Combinations
33) There are 8 homecoming princesses and you need to choose a queen and her first and second attendants from the princesses. How many ways can you pick the court from the 8 princesses?

34) Express your answer to question 33 in terms of factorials.

35) All 8 princesses decide that they don't want to have a queen and first and second attendant. How many ways could you pick three co-queens?

36) Express your answer to question 35 in terms of factorials.

37) How are the answers to questions 33 and 35 related?

38) A basketball team has 20 players how many ways can the coach choose his starting point guard, guard 2, shooting guard, forward, and center?

39) Express your answer to question 38 in terms of factorials.

40) A basketball team has 20 players how many ways can the coach choose his starting five (the positions are not important)?

41) Express your answer to question 40 in terms of factorials.

42) In a class of 30 students how many ways can you pick a class president, vice president, and secretary?

43) Express your answer to question 42 in terms of factorials.

44) In class of 30 students how many ways can you pick a committee of 3 students?

45) Express your answer to question 44 in terms of factorials.

46) If you have n objects how many ways can you choose a group of 3 of them if the order you pick them does not matter?

Calculate.

47) C(12, 3)

48) C(4, 2)

49) C(5, 5)

50) C(5, 1)

51) C(5, 4)

52) C(6, 1)

53) C(6, 5)

54) C(100, 97)

55) Notice that the answers to 45 and 46 are the same. Explain why this is both in terms of the formula and conceptually.

Decide whether each situation could be modeled by a permutation or a combination.

56) Selecting 10 math students to go to a math competition.

57) How many ways can 5 people stand in a line?

58) How many ways can you pick a president and vice president from 20 canidates?

59) Selecting 4 balls from a bin of 6.

60) Picking two movies to buy from Wal-Mart.