



6. Bronx is going on vacation to Florida and has only enough memory on his e-book reader to bring three of his favorite books. If he has narrowed his choice down to five books, in how many different ways can he choose three books to take?

7. A baseball manager is trying to decide on a batting lineup for his 12 players. He needs to select 9 players to bat and the order in which they will bat. How many different ways can this ordering be done?

8. Marcin is trying to assemble a collection of flowers for Valentine's Day. He is choosing six flowers from a selection of 20 red roses and 16 white roses. If he wants three of each, how many different collections could he create?

9. Combinations have many curious properties, the most important of which is illustrated in this problem. Calculate each of the following and then answer the follow up question.

(a)  ${}_5C_2 =$

(b)  ${}_8C_1 =$

(c)  ${}_{10}C_3 =$

${}_5C_3 =$

${}_8C_7 =$

${}_{10}C_7 =$

(d) Based on the pattern in the problems above, what combination must be equivalent to  ${}_{15}C_5$ ? Verify this equality using your calculator.

(e) If a person wanted to determine the number of ways of choosing 5 DVD's from a collection of 15, this count would be found in what alternative way based on (d)?

10. Which of the following is equivalent to  ${}_{18}C_6$ ?

(1)  ${}_{12}C_6$

(3)  ${}_{18}P_6 \cdot 6!$

(2)  $\frac{18!}{6!}$

(4)  ${}_{18}C_{12}$



11. The film club is trying to select the four movies they will watch at their movie marathon this weekend. The club has nominated six comedies, four mysteries, and eight action films.
- (a) How many different selections of four movies can they choose from the 18 movies nominated?      (b) How many of the selections from (a) contain no action films?
- (c) How many of the selections from (a) consist of two action films and two mysteries?      (d) How many of the selections from (a) consist of all comedies or all action films?
12. A new password system is being designed by an internet company. The password will have seven characters, either one of the 10 digits (0 to 9) or one of the 26 letters. Assuming the password is not case sensitive, determine the number of seven-character passwords that have the following characteristics.
- (a) The first four characters are letters, the last three are numbers, and no repetition is allowed.      (b) The first character is a letter, the last character is a number, and all others could be letters or numbers, with repetition allowed.
- (c) The first five characters are non-repeating letters and the last two are digits that may repeat but may not start with a zero.      (d) Characters must alternate between letters and digits, beginning with a letter, and must not repeat.
13. In a speech contest, five members from Arlington compete against 5 members of Ketcham. If prizes are handed out for first through fourth place, how many different ways could the prizes be handed out if Arlington wins first and second and Ketcham wins third and fourth?



14. Jonathan has to choose six songs to play off of his mp3 player for his daily workout. He has 95 songs to choose from.

- (a) How many different sets of six songs can he choose from his 95 song collection?      (b) Once he has chosen a set of six songs, in how many different orders could he listen to it?

15. Tanika is trying to decide on her class schedule for her senior year in high school. She has a list of 10 classes she would like to take, but room to only take 6 of these classes.

- (a) How many different selections of 6 classes can Tanika make from her 10 choices?      (b) How many different schedules could Tanika have? Assume that none of the classes conflict with one another and that taking a classes a different period constitutes a different schedule.

16. The game of pool consists of sinking balls numbered 1 through 15. Balls numbers 1 through 7 are colored solid, balls numbered 9 through 15 are striped. The 8-ball is colored black and is considered separate from the other two sets of seven solid and striped balls. To begin the game, the 15 balls are struck with the cue ball in an attempt to sink as many as possible, where the order of sinking the balls does not matter. If Daryl sinks three balls on the break, answer the following.

- (a) How many different sets of three balls could he have sunk?      (b) How many different sets of three balls could he have sunk that contain two solid and one striped ball?

- (c) How many different sets of three balls could he have sunk that do not contain the 8-ball?      (d) How many different sets of three balls could he have sunk that do contain the 8-ball?

