

**Solve:**

1. A class has 10 male students and 12 female students. How many ways can the class select a committee of 6 people to petition the teacher not to check homework if the committee has to have 3 males and 3 females?

$$a. \binom{10}{3} \binom{12}{3} = \frac{10!}{(10-3)!3!} * \frac{12!}{(12-3)!3!} = \frac{10*9*8}{3*2} * \frac{12*11*10}{3*2} = 26,400$$

2. A baseball team has 15 players. How many 9-player batting orders are possible?

$$a. {}_{15}P_9 = \frac{15!}{(15-9)!} = 15 * 14 * 13 * 12 * 11 * 10 * 9 * 8 * 7 = 1,816,214,400$$

3. There are 12 students running for student body government this year. There are five spots available (President, Vice President, Treasurer, Secretary, and Representative), how many outcomes are possible if Candidate 3 wins Presidency?

$$a. {}_{11}P_4 = \frac{11!}{(11-4)!} = 11 * 10 * 9 * 8 = 7,920$$

4. At a round table meeting for student council, the five officers along with the Principal work on solving some school issues. How many ways can the officers sit at the table if the Principal must sit next to the window? What if the President also had to sit next to the Principal?

- a. 5!  
b. 4!\*2

5. Seven cards are drawn from an ordinary deck. In how many ways is it possible to draw

- a. Only 4's  
i. 0

- b. Only 6's, 7's, and 8's

$$i. {}_{12}C_7 = \frac{12!}{(12-7)!7!} = \frac{12*11*10*9*8}{7*6*5*4*3*2} = 792$$

- c. No 6's, 7's, and 8's

$$i. {}_{40}C_7 = \frac{40!}{(40-7)!7!} = \frac{40*39*38*37*36*35*34}{7*6*5*4*3*2} = 18,643,560$$

- d. Exactly 2 kings or jacks

$$i. ({}_8C_2)({}_{44}C_5) = \frac{8!}{(8-2)!2!} * \frac{44!}{(44-5)!5!} = \frac{8*7}{2} * \frac{44*43*42*41*40}{5*4*3*2} = 30,408,224$$

- e. 2 spades and 5 hearts

$$i. ({}_{13}C_2)({}_{13}C_5) = \frac{13!}{(13-2)!2!} * \frac{13!}{(13-5)!5!} = \frac{13*12}{2} * \frac{13*12*11*10*9}{5*4*3*2} = 100,386$$

6. Write the coefficients for the expansion of  $(x + y)^{10}$ .

- a. 1, 9, 36, 84, 126, 126, 84, 36, 9, 1

7. A license plate has three letters followed by four numbers. Write out and simplify, but do not solve, how many different license plates can be made in the United States if no letter or number can be used more than once.

$$a. 50 * ({}_{10}P_3)({}_{26}P_4) = 50 * \frac{10!}{(10-3)!3!} * \frac{26!}{(26-4)!4!} = 50 * \frac{10*9*8}{3*2} * \frac{26*25*24*23}{4*3*2} = 2,152,800,000$$