

1. Simplify ${}_{m+2}C_m$ Leaving NO factorials in your answers.

$$= \frac{(m+2)!}{m!(m+2-m)!} = \frac{(m+2)!}{m!2!} = \frac{(m+2)(m+1)\cancel{m!}}{\cancel{m!}2} = \frac{(m+2)(m+1)}{2}$$

2. How many different letter arrangements can you make using all the letters in the word TOMORROW?

$$\frac{8!}{3!2!} = 3360 \text{ ways}$$

3. How many different five letter arrangements can you make using the letters in the word SIGNATURE if the first letter must be a vowel and the second letter must be a T?

$$\underline{4} \cdot \underline{1} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} = 840 \text{ ways}$$

4. You are opening a sandwich shop. You will offer 5 different types of bread, 6 different types of meat, 10 different types of vegetables, and 4 different types of dressings. How many different sandwiches can you make if you use one type of bread, one type of meat, two different vegetables, and one dressing?

$$\frac{5}{b} \cdot \frac{6}{m} \cdot \frac{10C_2}{v} \cdot \frac{4}{d} = 5400$$

5. I need to pick a new password for my iPhone. The password consists of 4 numbers and each number is a digit.

a. How many passwords do I have to choose from if there are no repeats?

$$10 \cdot 9 \cdot 8 \cdot 7 = 5040 \text{ passwords}$$

b. How many passwords do I have to choose from if repeats are okay?

$$10^4 = 10000 \text{ passwords}$$

c. How many passwords do I have to choose from if I do not want all 9s but I can have repeats?

$$10^4 - 1 = 9999 \text{ passwords}$$

one way for all 9s

6. I have 20 students that came in for extra help before the quiz. To reward them for working so hard I am going to put all of their names in a bag and pull three names out to win a homework pass. How many ways can I pick the winners?

$${}_{20}C_3 = 1140 \text{ ways}$$

7. Eight girls on the Color Guard team will try-out for Captain and assistant to the Captain, how many ways can I select the two positions?

$$\underline{8} \cdot \underline{7} = {}_8P_2 = 56 \text{ ways}$$

9a. How many ways can 10 students line up at the door?

$$\underline{10} \ \underline{9} \ \underline{8} \ \underline{7} \ \underline{6} \ \underline{5} \ \underline{4} \ \underline{3} \ \underline{2} \ \underline{1} \quad 10! \quad {}_{10}P_{10}$$

9b. How many ways can 10 students line up at the door if Tammy, Sam, and Chuck want to be next to each other.

$$\begin{array}{cccccccc} _ & _ & _ & _ & _ & _ & _ & \textcircled{_} \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array} \quad 8! \cdot 3! = 241,920 \text{ ways}$$

10. The school is forming a committee of 5. There are 12 students, 7 boys and 5 girls, to pick from.

a. How many ways can the committee have 3 girls and 2 boys?

$${}_5C_3 \cdot {}_7C_2 = 210 \text{ ways}$$

b. How many ways can the committee have at least 3 boys?

$${}_7C_3 \cdot {}_5C_2 + {}_7C_4 \cdot {}_5C_1 + {}_7C_5 = 546 \text{ ways}$$

3b2g or 4b1g or 5b0g