Precal H

9.1 Precalc H

Calculator OKAY

Name Key

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?

$\frac{8!}{3!\,2!} = 3360$ 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?

$4 \cdot 7 \cdot 6 \cdot 5 \cdot 1 = 840$ 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?

$\underset{b}{5} \cdot \underset{m}{6} \cdot \underset{v}{{}_{10}C_{2}} \cdot \underset{d}{4} = 5400$

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?

$10 \cdot 9 \cdot 8 \cdot 7 = 5040$ passwords

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

$10^4 = 10000$ passwords

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

$10^4 - 1 = 9999$ 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?

$_{20}C_3 = 1140$ ways

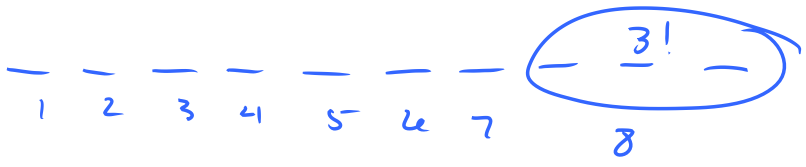
7. Eight girls on the Color Guard team will try-out for Captain and assistant to the Captain, how many ways can I select the two positions?

$_8P_2 = 56$ ways

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

$10!$

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



$8! \cdot 3!$

241,920 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?

$_5C_3 \cdot {}_7C_2 = 210$ ways

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

3b 2g or 4b 1g or 5b 0g

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

11. A couple has narrowed down the choice of a name for their new baby to three first names and five middle names. How many different first- and middle- name arrangements are possible?

$3 \cdot 5$

12. How many ways can three men and three women be seated in a row:

$2 \cdot {}_3P_3 \cdot {}_3P_3 = 2 \cdot 3! \cdot 3!$

a. So that no two men nor two women are seated next to each other?

$\frac{3}{m}\ \frac{3}{w}\ \frac{2}{m}\ \frac{2}{w}\ \frac{1}{m}\ \frac{1}{w}$ or $\frac{3}{w}\ \frac{3}{m}\ \frac{2}{w}\ \frac{2}{m}\ \frac{1}{w}\ \frac{1}{m}$

b. If one specific couple must be in the middle?

m or w

$\frac{4}{}\ \frac{3}{}\ \frac{2}{}\ \frac{1}{}\ \frac{2}{}\ \frac{1}{}$ or $2 \cdot {}_4P_4 = 2 \cdot 4!$

13. In how many ways can 4 people be seated in a row of 12 chairs?

${}_{12}P_4$

14. From a standard deck of 52 cards, a 5 card hand is dealt. In how many ways can the hand include:

c. All face cards? 12 face cards J, K, Q of each suit

${}_{12}C_5$

d. No face cards?

${}_{40}C_5$

e. At least one face card?

${}_{52}C_5 - {}_{40}C_5$

15. Five boys and five girls stand in a line. How many arrangements are possible if:

f. All of the boys stand in succession?

$5P5 \cdot 5P5$

g. The boys and girls stand alternately?

$2 \cdot 5P5 \cdot 5P5$

16. How many distinguishable arrangements can be formed from the letters in ***TALLAHASSEE***?

$$\frac{11!}{3! \cdot 2! \cdot 2! \cdot 2!}$$

17. Out of a group of 5 sophomores and 7 juniors, a committee of 4 students is being formed to help plan Hinsdale Central's Graduation ceremony.

h. How many committees are possible?

$12C4$

i. What if the committee is to be comprised of only juniors?

$7C4$

j. What if the committee must have either all juniors or all sophomores?

$7C4 + 5C4$

k. What if the committee must have at least one sophomore?

$12C4 - 7C4$