Name: _____

SM2 10.5: Combinations & Permutations

Compute.

1. $_8P_3$
   336

2. $_6P_6$
   720

3. $_7P_0$
   1

4. $_{10}P_1$
   10

5. What does the permutation $_5P_3$ tell us?
   The number of ways we can arrange 3 things if there are 5 to choose from

Find the number of distinguishable permutations for the following words

6. MATHEMATICS
   $\dfrac{11!}{2!\,2!\,2!} = 4{,}989{,}600$

7. SALTLAKECITY
   $\dfrac{12!}{2!\,2!\,2!} = 59{,}875{,}200$

8. CHEMISTRY
   $9! = 362{,}880$

9. HAMBURGER
   $\dfrac{9!}{2!} = 181{,}440$

Solve the following.

10. It is time to elect sophomore class officers. There are 12 people running for 4 positions: President, Vice President, Secretary and Historian. How many distinct ways can those positions be filled.

    $n = 12 \quad r = 4 \quad Order\ Matters \rightarrow {_{12}P_4} = 11{,}880$

11. You just bought 7 new movies on Amazon that arrive in the mail. You only have time to watch 3 of them this weekend. How many distinct ways can you choose the movies you will watch if the order that you watch them matters?

    $n = 7 \quad r = 3 \quad Order\ Matters \rightarrow {_7P_3} = 210$

12. A group of musicians is giving a short concert tonight. They have 14 recorded songs they could choose from but only have time to play 8 of them. How many distinct performances could they give?

    $n = 14 \quad r = 8 \quad Order\ of\ the\ songs\ matter \rightarrow {_{14}P_8} = 121{,}080{,}960$

Compute

13. $_{11}C_6$
    462

14. $_{32}C_0$
    1

15. $_{65}C_{62}$
    43,680

16. $_{10}C_5$
    252

17. What does the combination $_{15}C_7$ tell us?
    How many groups of 7 can be made if there are 15 to choose from

Solve the following.

18. 4 members from a group of 18 on the board of directors at the Fa La La School of Arts will be selected to go to a convention in Hawaii. How many different groups of 4 are there?

$$n = 18 \quad r = 4 \quad Order\ doesn't\ matter \rightarrow {}_{18}C_4 = 3,060$$

19. You just bought a new PS4. The store is giving away 3 new games out of a selection of 10 games. How many different groups of 3 games could you choose?

$$n = 10 \quad r = 3 \quad Order\ doesn't\ matter \rightarrow {}_{10}C_3 = 120$$

20. You are the manager of a new clothing store. You need 5 new employees and have 20 qualified applicants. How many different combinations could you create to staff your store?

$$n = 20 \quad r = 5 \quad Order\ doesn't\ matter \rightarrow {}_{20}C_5 = 15,504$$

Tell whether the situation is a Combination or Permutation. Then find the answer.

21. Find the number of ways a winner, second place and third place finisher can be determined in a race with 10 runners in it.
Type: PERMUTATION   Answer: ${}_{10}P_3 = 720$

22. How many ways can you selecting two out of eight employees to go on a business trip?
Type: COMBINATION   Answer: ${}_8C_2 = 28$

23. How many ways can a coach choose a team of five players to play on your basketball team out of twenty players trying out for the team?
Type: COMBINATION   Answer: ${}_{20}C_5 = 15,504$

24. Find the number of distinct way of selecting three one-digit numbers (0-9) for a raffle that gives the prize to the person who chose the numbers in the right order.
Type: PERMUTATION   Answer: ${}_{10}P_3 = 720$

25. How many different ways can you arrange the letters in the word MOTHER?
Type: PERMUTATION   Answer: ${}_6P_6 = 720$ or $6! = 720$

26. How many different ways can a teacher create a group of 4 students to work together in a class with 24 students in it?
Type: COMBINATION   Answer: ${}_{24}C_4 = 10,626$

You Decide

You are registering for your junior year in school. Your school is on a block schedule, four periods each day. You must take the following courses: English, history, math, and science. You can fill the other four periods with electives only. Assume that every class is available during every class period and you can't take a class twice.

English (3)	Math (7)	Science (8)	History (4)	Elective (30)	
English 11	Sec Math 3	Biology	U.S. History	European Hist.	Photo
English 11H	Sec Math 3H	Chemistry	Government	Crafts	PE
AP Literature	PreCalculus	Physics	Current Issues	AP Psychology	Sports
	AP Calculus	AP Biology	AP U.S. Hist.	Sociology	EMS
	Intro. to Stats	AP Chem		Spanish	Medicine
	AP Stats	AP Physics		French	Interior Design
	Finance	Geology		Chinese	Web Design
		Horticulture		Band	Woods
				Orchestra	Drafting
				Choir	Auto
				Dance	Sewing
				Drama	Foods
				Ceramics	Financial Lit
				Painting	Plants & Soils
				Drawing	Release Time

27. If you are not focusing on the order of your classes how many schedules of 8 classes could you create?

1 English Class:	1 Math Class:	1 Science Class:	1 History Class:	4 Elective Classes:
$_3C_1$	$_7C_1$	$_8C_1$	$_4C_1$	$_{30}C_4$

$$_3C_1 \cdot _7C_1 \cdot _8C_1 \cdot _4C_1 \cdot _{30}C_4 = 18{,}416{,}160$$

28. Assuming you have chosen all 8 of your classes, how many ways could you schedule them?

$$Ways\ to\ ARRANGE\ 8\ classes:\quad _8P_8 = 40{,}320$$

29. If your Math class had to be during A1 period, how many different schedules could you have?

$$Ways\ to\ ARRANGE\ the\ remaining\ 7\ classes:\quad _7P_7 = 5{,}040$$

30. If you were going to do an internship on B days and take no classes on that day how many different schedules could you create to cover your core classes (English, history, math and science), if the order doesn't matter?

$$_3C_1 \cdot _7C_1 \cdot _8C_1 \cdot _4C_1 = 672$$