Homework Answers:

3.	5,040	18.	4,060
6.	21	21.	C
9.	1,680	24a.	C b.P
12.	336	27.	P
15.	330	30.	C

Permutations and Combinations Worksheet

Permutations
Order Matters
(Arrangements)
- Positions
- Places
- Pres, VP

Evaluate each permutation or combination (you must show the set up) :

1. $_7P_3$ 2. $_7P_4$ 3. $_7P_7$ 4. $_8C_3$ 5. $_8C_5 \cdot _7C_3$ 6. $_7C_2$

Combinations
Order doesn't matter
"Choose"

Find the number of possibilities (you must show the set up).

7. The ski club with ten members is to choose three officers captain, co-captain & secretary, how many ways can those offices be filled?

$_{10}P_3$

8. The company Sea Esta has ten members on its board of directors. In how many different ways can it elect a president, vice-president, secretary and treasurer?

$_{10}P_4$

9. For a segment of a radio show, a disc jockey (Dr. Jams) can play 4 songs. If there are 8 to select from, in how many ways can the program for this segment be arranged?

10. Suppose you are asked to list, in order or preference, the three best movies you have seen this year. If you saw 10 movies during the year, in how many ways can the three best be chosen and ranked?

$_{10}P_3$

11. In the Long Beach Air Race six planes are entered and there are no ties, in how many ways can the first three finishers come in?

$_6P_3$ $\underline{6} \times \underline{5} \times \underline{4}$

12. In a production of *Grease*, eight actors are considered for the male roles of Danny, Kenickie, and Marty. In how many ways can the director cast the male roles?

13. Seven bands have volunteered to perform at a benefit concert, but there is only enough time for four of the bands to play. How many lineups are possible?

$_7P_4$

Find the number of combinations (you must show the set up).

14. An election ballot asks voters to select three city commissioners from a group of six candidates. In how many ways can this be done?

$_6C_3$

15. A four-person committee is to be elected from an organization's membership of 11 people. How many different committees are possible?

16. You are on your way to Hawaii (Aloha) and of 15 possible books your parents say you can only take 10. How many different collections of 10 books can you take?

$_{15}C_{10}$

17. There are 12 standbys who hope to get on your flight to Hawaii, but only 6 seats are available on the plane. How many different ways can the 6 people be selected?

$_{12}C_6$

18. To win the small county lottery, one must correctly select 3 numbers from 30 numbers. The order in which the selection is made does not matter. How many different selections are possible?

Identify the following as <u>P</u>ermutations, <u>C</u>ombinations or <u>C</u>ounting <u>P</u>rinciple problems. (no need to solve)

P 19. In a race in which six automobiles are entered and there are not ties, in how many ways can the first four finishers come in?

CP 20. The model of the car you are thinking of buying is available in nine different colors and three different styles (hatchback, sedan, or station wagon). In how many ways can you order the car? $9 \times 3 = 27$

X 21. A book club offers a choice of 8 books from a list of 40. In how many ways can a member make a collection?

C 22. A medical researcher needs 6 people to test the effectiveness of an experimental drug. If 13 people have volunteered for the test, in how many ways can 6 people be selected?

C 23. From a club of 20 people, in how many ways can a group of three members be selected?

X 24. From the 30 pictures I have of my daughter's first birthday, my digital picture frame will only hold 3 at a time.
  a. How many different groups of 3 pictures can I put on the frame?
  b. What if I just wanted to fill the first three places with my favorite, best smile and best smashing of the cake?

CP 25. A popular brand of pen is available in three colors (red, green or blue) and four tips (bold, medium, fine or micro). How many different choices of pens do you have with this brand? $3 \times 4 = 12$

P 26. A corporation has ten members on its board of directors. In how many ways can it elect a president, vice-president, secretary and treasurer?

X 27. For a segment of a radio show, a disc jockey can play 7 songs. If there are 12 songs to select from, in how many ways can the program for this segment be arranged?

C 28. How many different ways can a director select 4 actors from a group of 20 actors to attend a workshop on performing in rock musicals?

P 29. What if the director in #28 wanted to fill positions of lead, supporting actor, extra 1 and extra 2?

X 30. From the 20 CD's you bought this past year, you plan to take 3 with you on vacation. How many different sets of three CD's can you take?

C 31. Suppose you find 7 articles related to the topic of your research paper. In how many ways can you choose 5 articles to read?

CP 32. You want to get a cell phone and you must decide on the right plan. If there are 10 different phones, 6 different calling plans and 3 different texting plans, how many different plans could you pick from if you can choose one phone, one calling plan and one texting plan? $10 \times 6 \times 3 = 180$

Answers

1. 210	2. 840	3. 5040	4. 56	5. 1960	6. 21	7. 720	8. 5040
9. 1680	10. 720	11. 120	12. 336	13. 840	14. 20	15. 330	16. 3003
17. 924	18. 4060	19. P	20. CP	21. C			
22. C	23. C	24. a. C b. P		25. CP	26. P	27. P	28. C
29. P	30. C	31. C	32. CP				

Homework

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Skip the Calculations Column