

## Ch.14 Permutations and Combinations

Name:

Per:

Evaluate each permutation or combination without a calculator (you must show the set up using factorials, then cancel.)

1.  ${}_7P_3$

2.  ${}_7P_4$

3.  ${}_7P_7$

4.  ${}_8C_3$

5.  ${}_7C_2$

6.  ${}_8C_5 \cdot {}_7C_3$

**Find the number of possibilities using the probability option in your calculator (show the notation used to solve.)**

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

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

9. A company has ten members on its board of directors. How many different ways can it elect a president, vice-president, secretary and treasurer?

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

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

12. A young girl is on her way to Hawaii (aloha) with her family. Of 15 possible books, her parents say she can only take 10. How many different collections of 10 books are possible?

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

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

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

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

17. 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?

18. 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?

**Check Answers #1-18:**

56	720	720	20	840	924	330	1680	336
120	5040	21	4060	840	1960	210	3003	5040

**General arrangements SHOW WORK by making a decision chart, reduce all fractions**

19. A train is made up of a locomotive, seven different cars, and a caboose. If the locomotive must be first and the caboose must be last, how many ways can the train be ordered?

- a) 5040                      b) 81,440                      c) 362,880                      d) 823,543

20. A popular brand of pen is available in three colors (red, green, blue) and four tips (bold, medium, fine, micro.) How many different choices of pens do you have with this brand?

- a) 7                              b) 12                              c) 14                              d) 30

21. A phone company offers 10 different cell phones, 6 different calling plans and 3 different texting plans. How many different plans are available if you choose one phone, one calling plan, and one texting plan?

- a) 19                              b) 60                              c) 120                              d) 180

**General probability SHOW WORK!**

**CHECK ANSWERS #19-28: AA BBBB CC DDD**

22. A bag contains 30 blue marbles, 20 red marbles, and 10 black marbles. If you select one marble from the bag, what is the probability that it is blue?

- a)  $\frac{1}{3}$                               b)  $\frac{2}{3}$                               c)  $\frac{1}{6}$                               d)  $\frac{1}{2}$

23. A bag contains 30 blue marbles, 20 red marbles, and 10 black marbles. If you select one marble from the bag, what is the probability that it is red or blue?

- a)  $\frac{1}{2}$                               b)  $\frac{5}{6}$                               c)  $\frac{1}{3}$                               d)  $\frac{2}{3}$

24. A standard number cube is rolled. What is the probability of rolling a number less than 5?

- a)  $\frac{2}{3}$                               b)  $\frac{1}{2}$                               c)  $\frac{5}{6}$                               d)  $\frac{1}{6}$

25. A standard number cube is rolled. What is the probability of rolling an even number or a number less than 4?

- a)  $\frac{2}{3}$                               b)  $\frac{1}{2}$                               c)  $\frac{5}{6}$                               d)  $\frac{1}{3}$

26. Two number cubes are rolled. What is the probability that both cubes show a 4?

- a)  $\frac{1}{3}$                               b)  $\frac{1}{2}$                               c)  $\frac{1}{6}$                               d)  $\frac{1}{36}$

27. In a detective game, there are 6 suspects, 6 weapons, and 9 rooms. What is the probability that the crime was committed by the housekeeper in the library with a candlestick holder?

- a)  $\frac{1}{108}$                               b)  $\frac{1}{216}$                               c)  $\frac{1}{324}$                               d)  $\frac{1}{54}$

28. Two slips of paper are selected at random from a box containing ten slips numbered from 1 to 10. What is the probability of choosing an even number followed by an odd number if the slips of paper are not replaced?

- a)  $\frac{1}{2}$                               b)  $\frac{5}{18}$                               c)  $\frac{5}{9}$                               d)  $\frac{4}{5}$

29. On a certain day, the chance of rain is 80% in San Francisco and 30% in Sydney. What is the probability that it will NOT rain in either city?

- a) 7%                              b) 14%                              c) 24%                              d) 50%