Algebra 2 Honors

Permutations and Combinations Worksheet

Name Key
Assignment:

Determine whether each situation involves a permutation or a combination. Then find the number of possibilities.

1. **Playing Cards:** From a standard deck of 52 cards, in how many ways can 7 cards be drawn?

$_{52}C_7 = 133{,}784{,}560$

2. **Watching a Play:** Seating 8 students in 8 seats in the front row of the school auditorium.

$_8P_8 = 40{,}320$

3. **Committees:** From a group of 10 men and 12 women, how many committees of 5 men and 6 women can be formed?

$_{10}C_5 \cdot {}_{12}C_6 = 252 \cdot 924 = 232{,}848$

4. **Hockey:** How many hockey teams of 6 players can be formed from 14 players without regard to position played?

$_{14}C_6 = 3{,}003$

5. **Basketball:** Introducing the 5 starting players on the Blue Devil's basketball team at the beginning of the next basketball game.

$_5P_5 = 120$

6. **Library Books:** Checking out 4 library books from a list of 8 books for a research paper.

$_8C_4 = 70$

7. **Movies:** Choosing 5 movies to rent if you want ~~a few Science Fiction films and at~~ 2 or 3 or 4 or 5 wes least 2 Westerns. The store has 8 Westerns and 12 Science Fiction films.

$_8C_2 \cdot {}_{12}C_3 + {}_8C_3 \cdot {}_{12}C_2 + {}_8C_4 \cdot {}_{12}C_1 + {}_8C_5 \cdot {}_{12}C_0$

$28 \cdot 220 + 56 \cdot 66 + 70 \cdot 12 + 56 \cdot 1 = 10{,}752$

8. **Race:** Choosing the first, second, and third-place finishers in a race with 10 competitors.

$_{10}P_3 = \boxed{720}$

9. **Election:** Electing 4 candidates to a municipal planning board from a field of 7 candidates.

$_7C_4 = \boxed{35}$

10. **Vegetables:** Choosing 3 side-dishes from a menu that offers 6 vegetable side-dishes and 4 starches if you want at least one of each.

$_6C_2 \cdot {}_4C_1 + {}_6C_1 \cdot {}_4C_2$

$15 \cdot 4 + 6 \cdot 6 = \boxed{96}$

11. **Letters:** An arrangement of the letters in the word ***rhombus***.

$\frac{7!}{1!} = \boxed{5{,}040}$

12. **Orange Juice:** Selecting 2 of 8 possible different brands of orange juice at the store.

$_8C_2 = \boxed{28}$

13. **Gardening:** Placing a red rose bush, a yellow rose bush, a white rose bush, and a pink rose busy in a row in a planter.

$_4P_4 = \boxed{24}$

14. **Kittens:** Selecting 2 orange tabbies from of 9 kittens at an animal rescue shelter.

$_9C_2 = \boxed{36}$

15. **Letters:** An arrangement of the letters in the word ***isosceles***.

$\frac{9!}{2!2!1!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3}{3 \cdot 2 \cdot 1} = \boxed{30{,}240}$

16. **Bobsleigh:** Selecting a 4-person bobsled team, if one of the team members must be from a group of 9 football players and the other 3 may be from a group of 8 other athletes.

$_9C_1 \cdot {}_8C_3 = 9 \cdot 56 = \boxed{504}$

17. **Pandora:** Arranging 4 charms from 6 possible, on a bracelet that has a clasp, a front, and a back.

$_6P_4 = \boxed{360}$

18. **Dessert:** Selecting 3 desserts from 10 possible choices displayed on the dessert cart at a restaurant.

$_{10}C_3 = \boxed{120}$

19. **Sales Team:** Forming a 4-person sales team from a group of 12 salesmen and 8 saleswomen, if you want at most 2 women on the team. 0 or 1 or 2

$_8C_0 \cdot {}_{12}C_4 + {}_8C_1 \cdot {}_{12}C_3 + {}_8C_2 \cdot {}_{12}C_2$

$1 \cdot 495 + 8 \cdot 220 + 28 \cdot 66 = \boxed{4,103}$

20. **Polygons:** Making a 5-sided polygon by choosing any of 5 of 11 points located on a circle to be the vertices.

$_{11}C_5 = \boxed{462}$

21. **Musical Chairs:** Seating 5 men and 5 women alternately in a row, beginning with a woman.

$5 \cdot 5 \cdot 4 \cdot 4 \cdot 3 \cdot 3 \cdot 2 \cdot 2 \cdot 1 \cdot 1$

$_5P_5 \cdot {}_5P_5 = 120 \cdot 120 = \boxed{14,400}$

22. **Student Groups:** Farmington High is planning its academic festival. All math classes will send 2 representatives to compete in the math bowl. How many different groups of students can be chosen from a class of 16 students?

$_{16}C_2 = \boxed{120}$

23. **Photography:** A photographer is taking pictures of a bride and groom and their 6 attendants. If she takes photographs of 3 people in a group, how many different groups can she photograph?

$_8C_3 = \boxed{56}$

24. **Airlines:** An airline is hiring 5 flight attendants. If 8 people apply for the job, how many different groups of 5 attendants can the airline hire?

$_8C_5 = 56$

25. **Subscriptions:** A school librarian would like to buy subscriptions to 7 new magazines. Her budget however, will allow her to buy only 4 new subscriptions. How many different groups of 4 magazines can she choose from the 7 magazines?

$_7C_4 = 35$

26. **Newspaper:** Your school newspaper has an editor-in-chief and an assistant editor-in-chief. The staff of the newspaper has 12 students. In how many ways can students be chosen for these two positions?

$_{12}P_2 = 132$

27. **Student Council:** Five representatives from a senior class of 280 students are to be chosen for the student council. In how many ways can students be chosen to represent the senior class on the student council?

$_{280}C_5 = 1.3836 \times 10^{10}$

28. **Cards:** In how many ways can you pick 5 cards if you must choose a Queen, then a King and, then 3 other cards if every card is drawn one at a time?

$_4C_1 \cdot {}_4C_1 \cdot 50 \cdot 49 \cdot 48 = 1,881,600$