

HOMEWORK: COUNTING PRINCIPLES

NAME: _____

DAY 3 DUE: _____

Compute the following with a calculator.

1. ${}_5P_3 = 60$

5. ${}_4C_1 = 4$

2. ${}_4P_1 = 4$

6. ${}_4C_4 = 1$

3. ${}_6P_6 = 720$

7. $6! = 720$

4. ${}_5C_3 = 10$

8. $5! = 120$

License Plate Configurations: Determine how many possible ways the a license plate can be made meeting the requirements if letter and digits CANNOT be repeated.

9. 4 letters, and 3 digits $\underline{26} \underline{25} \underline{24} \underline{23} - \underline{10} \underline{9} \underline{8} = 258,336,000$
plates

10. 3 letters, and 4 digits $\underline{26} \underline{25} \underline{24} - \underline{10} \underline{9} \underline{8} \underline{7} = 78,624,000$ plates

11. 7 digits $\underline{10} \underline{9} \underline{8} \underline{7} \underline{6} \underline{5} \underline{4} = 604,800$ plates

Use either permutations or combinations to answer the following questions.

- P 12. The Spanish Club is electing a president, vice president, and secretary from the 8 eligible members. How many different ways can the three offices be filled?

$$\underline{8} \underline{7} \underline{6} = 336 \text{ ways}$$

- C 13. Five representatives from the class of 32 students are being chosen to a committee. How many different ways can those 5 students be chosen?

$${}_{32}C_5 = \frac{32!}{(32-5)!5!} = \frac{32!}{27!5!} = \frac{32 \cdot 31 \cdot 30 \cdot 29 \cdot 28}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 201,376$$

- P 14. The school newspaper has an editor in chief and an assistant editor. The staff of the newspaper has 12 students. How many ways can students be elected to the two positions?

$${}_{12}P_2 = \underline{12} \cdot \underline{11} = 132 \text{ ways}$$

- P 15. In a race, the top five finishers are awarded points for their team. There are 12 people running in a particular race. In how many ways can the people finish 1st, 2nd, 3rd, 4th, and 5th?

$${}_{12}P_5 = \underline{12} \cdot \underline{11} \cdot \underline{10} \cdot \underline{9} \cdot \underline{8} = \text{95,040 ways}$$

- C 16. In a race, the top five finishers are awarded points for their team. There are 12 people running in a particular race. In how many ways can the people finish in the top 5?

$${}_{12}C_5 = \frac{12!}{(12-5)!5!} = \frac{12!}{7!5!} = \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{95,040}{120} = \text{792 ways}$$

- P 17. In how many ways can 8 people be seated in a row of 5 chairs?

$${}_8P_5 = \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} = \text{6,720 ways}$$

- P 18. The starting lineup for a baseball team consists of 9 players. Assuming that each member of a team with 25 players can play each position, in how many different ways can the starting lineup be filled?

$${}_{25}P_9 = \underline{25} \cdot \underline{24} \cdot \underline{23} \cdot \underline{22} \cdot \underline{21} \cdot \underline{20} \cdot \underline{19} \cdot \underline{18} \cdot \underline{17}$$

- C 19. From a group of 40 people, a jury of 12 people is selected. In how many different ways can a jury of 12 people be selected?

$${}_{40}C_{12} = \frac{40!}{(40-12)!12!} = \frac{40!}{28!12!} = \text{5,586,853,480 ways}$$

20. In a local restaurant, there are 3 choices for appetizer, 7 choices for entrée, 4 items for dessert, and 5 choices for drinks. In how many ways can a customer order a full meal?

$$\underline{3} \cdot \underline{7} \cdot \underline{4} \cdot \underline{5} = \text{420 ways}$$

- C 21. In order to conduct an experiment, 4 subjects are randomly selected from a group of 20 subjects. How many different groups of four subjects are possible?

$$\begin{aligned} {}_{20}C_4 &= \frac{20!}{(20-4)!4!} = \frac{20!}{16!4!} = \frac{20 \cdot 19 \cdot 18 \cdot 17}{4 \cdot 3 \cdot 2 \cdot 1} \\ &= \frac{116,280}{24} \\ &= \text{4845 groups} \end{aligned}$$