Name: key Date:

6.0 Fundamental Counting Principle and Permutations ~~Algebra II HONORS~~

HOMEWORK

1. A restaurant offers four sizes of pizza, two types of crust, and eight toppings. How many possible combinations of pizza with one topping are there?

$4 \cdot 2 \cdot 8$ 64

2. How many ways can 5 paintings be line up on a wall?

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 =$ 120

3. Rob has 4 shirts, 3 pairs of pants, and 2 pairs of shoes that all coordinate. How many outfits could he put together?

$4 \cdot 3 \cdot 2 =$ 24

4. Grace loves to eat salad! How many salads can she put together if she can pick out one type of lettuce from 2 choices, one vegetable from 4 choices and one dressing from 7 choices?

$2 \cdot 4 \cdot 7 =$ 56

5. PA license plates have 3 letters followed by 4 numbers. a. If the same letter or number can be repeated, how many can be made? b. If the same letter CANNOT be repeated, how many can be made?

(a) $26^3 \cdot 10^4 =$ 175760000

(b) $26 \cdot 25 \cdot 24 \cdot 10 \cdot 10 \cdot 10 \cdot 10$ 156,000,000

6. How many 5-digit numbers can be formed (using 0 – 9)?

90000 $= 9 \cdot 10 \cdot 10 \cdot 10 \cdot 10$

7. How many 5-digit numbers can be formed if each one uses all the digits 0, 1, 2, 3, 4 without repetition?

$4 \cdot 4 \cdot 3 \cdot 2 \cdot 1 =$ 96

16 × 6 = 96

8. In how many ways can 6 bicycles be parked in a row?

$6!$ 720

9. Rewrite 10! with a factor of 8!

$10 \cdot 9 \cdot 8!$

10. Evaluate $\frac{12!}{9!3!}$

$\frac{12 \cdot 11 \cdot 10 \cdot 9!}{9! \cdot 3 \cdot 2} = 11 \cdot 20 =$ 220

11. In how many ways can 7 different cards be laid out on a table in a row?

$7! =$ 5,040

12. A lock contains 3 dials, each with ten digits. How many possible sequences of numbers exist?

$10^3 =$ 1,000

13. Four students are to be chosen from a group of 10 to fill the positions of president, vice-president, treasurer and secretary. In how many ways can this be accomplished?

$10 \cdot 9 \cdot 8 \cdot 7 = 5040$ $\quad {}_{10}P_4$

14. How many ways can the letters MATH be arranged?

$4! = 24$

15. A shelf can hold 7 trophies. How many ways can the trophies be arranged if there are 10 trophies available?

${}_{10}P_7 \quad 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 = 604{,}800$

16. Bill has three pairs of pants, 5 shirts and 2 pairs of shoes. How many outfits can he make?

$3 \cdot 5 \cdot 2 = 30$

17. How many 5-number license plates can be made using the digits 0, 1, 2, 3, 4, 5, if a) repetitions ARE allowed b. repetitions are NOT allowed

(a) $6^5 = 7776$ $\quad$ (b) $= 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 = 720$

18. A teacher wants to write an ordered 4-question test from a pool of 12 questions. How many different forms of the test can the teacher write?

$12 \cdot 11 \cdot 10 \cdot 9 = 11{,}880$

19. How many 5-number license plates can be made using the digits 1, 2, 3, 4, 5, 6, 7, if an odd digit must come first and a. repetitions ARE allowed b. repetitions are NOT allowed

(a) $4 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 9604$ $\quad$ (b) $4 \cdot 6 \cdot 5 \cdot 4 \cdot 3$

20. Assume the same situation as the previous question, but state how many EVEN license plates can be made if repetitions ARE allowed.

$7 \cdot 7 \cdot 7 \cdot 7 \cdot 3 = 7{,}203$ $\quad 1440$

21. In how many ways can 4 blue, 3 red, and 2 green flags be arranged on a pole?

1260 $\quad$ RAIN $\quad 4 \cdot 7 \cdot 5 \cdot 9 \quad \frac{9!}{4!3!2!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4!}{4! \cdot 6 \cdot 2}$

22. Find the number of permutations of the letters of these words: a. DEED b. COMMITTEE c. CINCINNATI

(a) $\frac{4!}{2!2!} = \frac{4 \cdot 3 \cdot 2}{2 \cdot 2} = 6$ $\quad$ (b) $\frac{9!}{2!2!2!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2}{2 \cdot 2 \cdot 2} = 45360$

23. A player in a word game has the letters E, E, B, D, G, G, G. In how many ways can these letters be arranged?

$\frac{7!}{2!3!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2}{2 \cdot 3 \cdot 2} = 420$ $\quad$ (c) $\frac{10!}{3!2!3!}$ $\quad 50{,}400$

24. Find the number of permutations of six colors on a spinner.

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

25. Find the number of ways 10 cheerleaders can make a circular formation.

$9! = 362{,}880$