LESSON 11-7

Practice A

Permutations

1. In how many ways can you arrange the letters in the word NOW? List the permutations.

   6 ways; now, nwo, own, onw, won, wno

2. In how many ways can you arrange the numbers 4, 5, 6, and 7 to make a three-digit number? List the permutations.

   24 ways; 4,567; 4,576; 4,657; 4,675; 4,756; 4,765; 5,467; 5,476; 5,647; 5,674; 5,746; 5,764; 6,457; 6,475; 6,547; 6,574; 6,745; 6,754; 7,456; 7,465; 7,546; 7,564; 7,645; 7,654

3. Find the number of permutations of the letters in the word FOUR. 24

4. In how many ways can you arrange the numbers 3, 4, 5, 6, and 7 to make a five-digit number? 120 ways

5. Find the number of ways you can arrange the letters in the word *arrange.* 5,040

Choose the letter for the best answer.

6. What is another way of showing 5 factorial or 5!?
   A 5^3
   B 5 + 4 + 3 + 2 + 1
   C 5 • 4 • 3 • 2 • 1
   D 5^5

7. How many permutations of the numbers 10 through 14 are there?
   F 10!
   G 5!
   H 4!
   J 14!

8. In how many ways can 5 children be matched with 5 puppies?
   A 5 **C** 100
   B 25 **D** 120

9. Six friends are waiting in line at the movie theater. In how many different orders can they be standing in line?
   F 720 **H** 36
   G 120 **J** 6

10. How many permutations of the numbers 1 through 9 are there?
    A 9 **C** 9!
    B 900,000 **D** 9^9

11. In how many different ways can seven drivers be matched up with seven rental cars?
    F 5,040 **H** 49
    G 2,401 **J** 7

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LESSON 11-7

Practice B

Permutations

1. Joe has homework assignments for math, Spanish, and history. In how many different orders can he do his homework? 6 orders

2. Find the number of permutations of the letters in the word SMART. 120

3. In how many ways can you arrange the numbers 6, 7, 8, and 9 to make a four-digit number? 24 ways

4. A table has 8 seats. In how many different ways can 8 people sit at the table? 40,320 ways

5. Nine mountain bikers are on a bicycle trip. In how many possible ways can they follow each other? 362,880 ways

6. Seven students are waiting in line at the cafeteria. In how many different orders can they be standing in line? 5,040 orders

7. How many permutations of the letters A through F are there? 720

8. Ed, Martine, Sal, Carl, Paula, Terry, Ken, Leo, Ursula, and Jamie are in a race. In how many different orders can they finish? 3,628,800

9. Find the number of permutations of the letters in the word *permutations.* 479,001,600

10. In how many different orders can 11 people stand in line? 39,916,800

11. In how many different ways can a librarian arrange eight books on a shelf? 40,320 ways

12. Melinda has 15 art trophies. Write an expression that shows how many different ways she can line up her trophies on a shelf. 15!

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LESSON 11-7

Practice C

Permutations

1. **a.** Find the number of permutations of the letters in the word BRAIN. 120

   b. If you choose one of the permutations at random, what is the probability that it will start with a vowel? $\frac{2}{5}$

2. **a.** In how many ways can you arrange the numbers 4, 5, 6, 7, 8, and 9 to make a six-digit number? 720 ways

   b. If you choose one of the six-digit numbers at random, what is the probability that the number will be less than 600,000? $\frac{1}{3}$

3. Eight skydivers are on an airplane. In how many possible ways can they jump from the plane? 40,320 ways

4. There are seven different flavors of yogurt at a supermarket. In how many different orders can they be lined up on the shelf? 5,040 orders

5. How many permutations of the numbers 1 through 9 are there? 362,880

6. In how many different ways can a video store arrange ten videos on a shelf? 3,628,800 ways

7. Harrison has a collection of 25 antique teapots. Write an expression that shows in how many different ways he can display his teapots. 25!

Determine whether each problem involves permutations or combinations.

8. Elect four people to be president, vice president, secretary, and treasurer. permutations

9. Order a three-topping pizza from a choice of eight toppings. combinations

10. Decide how many ways you can put ten books on a shelf. permutations

11. Organize 30 students into two-person doubles teams. combinations

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LESSON 11-7

Reteach

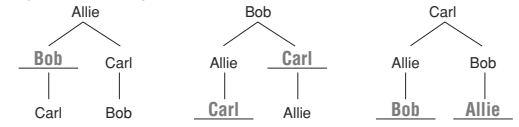
Permutations

A **permutation** is a selection of objects in a particular order.

In how many ways can Allie, Bob, and Carl stand in a line?

You can draw a tree diagram to find the number of permutations.

1. Complete the tree diagram.



2. Complete the list of the outcomes.

   Allie Bob Carl Bob Allie Carl Carl Allie Bob

   Allie Carl Bob Bob Carl Allie Carl Bob Allie

You can also use multiplication to find the number of permutations.

3. Complete the multiplication.

   3 × 2 × 1 = 6

   3: Choices for first in line; 2: Choices for second in line; 1: Choices for third in line; 6: Number of permutations

4. There are 6 permutations for 3 people standing in line.

You can find the probability that they will be standing in line alphabetically.

5. P(alphabetical order) = $\frac{\text{number of alphabetical arrangements}}{\text{total number of permutations}} = \frac{1}{6}$

6. Find the number of ways you can arrange the letters in the word MATH.

   4 • 3 • 2 • 1 = 24 ways

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