

Fundamental Counting Principle

For each of the following situations, (A) draw a tree diagram (B) write all possible combinations (C) give the total number of combinations.

1. A shirt company makes t-shirts that come in both long and short sleeves; colors of red, blue, yellow, and green; and patterned and solid material. $2 \cdot 4 \cdot 2 = 16$

2. A restaurant has a special that includes picking one item from each of the following: meat (beef, pork, turkey, or chicken); vegetable (corn, beans, or salad); and dessert (pie or cookies). $4 \cdot 3 \cdot 2 = 24$

Solve.

3. A briefcase lock has 3 rotating cylinders, each containing 10 digits. How many numerical codes are possible? $10 \cdot 10 \cdot 10 = 1000$

4. A golf club manufacturer makes irons with 7 different shaft lengths, 3 different grips, 5 different lies, and 2 different club head materials. How many different combinations are offered? $7 \cdot 3 \cdot 5 \cdot 2 = 210$

5. There are five different routes that a commuter can take from her home to the office. In how many ways can she make a round trip if she uses a different route coming than going? $5 \cdot 4 = 20$

6. In how many ways can the 4 call letters of a radio station be arranged if the first letter must be W or K and no letters repeat? $2 \cdot 25 \cdot 24 \cdot 23 = 27600$

7. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1? $8 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 8,000,000$

8. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1 and if no digit can be repeated? $8 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 = 483,840$

9. The letters A, B, C, and D are used to form four-letter passwords for entering a computer file. How many passwords are possible if letters can be repeated any number of times? $4 \cdot 4 \cdot 4 \cdot 4 = 256$

10. How many ways can the first five letters of the alphabet be arranged if each is used only once? $5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

11. A restaurant serves 5 main dishes, 3 salads, and 4 desserts. How many different meals could be ordered if each has a main dish, a salad, and a dessert? $5 \cdot 3 \cdot 4 = 60$

12. How many different ways can 4 different books be arranged on the shelf? $4 \cdot 3 \cdot 2 \cdot 1 = 24$

13. How many 5-digit even numbers can be formed using the digits 4, 6, 7, 2, and 8 if digits can be repeated any number of times? $5 \cdot 5 \cdot 5 \cdot 5 \cdot 4 = 2500$

14. How many 4-digit positive even integers are there? $9 \cdot 10 \cdot 10 \cdot 5 = 4500$

15. How many license plate numbers consisting of three letters followed by three numbers are possible when repetition is allowed? $26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 = 1,757,600$

16. How many combinations are possible using the information in problem 15 if no repetition is allowed? $26 \cdot 25 \cdot 24 \cdot 10 \cdot 9 \cdot 8 = 11,232,000$

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DIRECTIONS:

Figure out the answer to any question below. Then find your answer in the coded line at the bottom of the page.

Each time the answer appears in the code, write the letter of that question above it.

KEEP WORKING AND YOU WILL DECODE THE LINE.

- (A) How many arrangements of the letters M, A, T, and H are possible if each letter can be used only once in each arrangement? $4 \cdot 3 \cdot 2 \cdot 1 = 24$
- (S) Six people are to be seated in a row of six chairs. How many different seating arrangements are possible? $6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$
- (D) There are 3 roads connecting Towns A and B, and 4 roads connecting Towns B and C. How many different routes are there from Town A to Town C? $3 \cdot 4 = 12$
- (O) The GT Dragger offers 5 different engines, 4 different paint jobs, and 2 different radios. How many different "packages" are possible? $5 \cdot 4 \cdot 2 = 40$
- (I) How many different batting orders are possible for the 9 men on a baseball team? $9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 362,880$
- (V) Orgo has 5 pairs of pants, 6 sport shirts, and 3 belts. How many different outfits can he make using these items? $5 \cdot 6 \cdot 3 = 90$
- (L) How many different 2-letter arrangements can be selected from the set {S, H, A, R, K} ? $5 \cdot 4 = 20$
- (P) How many 3-letter arrangements are possible using the 26 letters of the alphabet if no letter can be used more than once? $26 \cdot 25 \cdot 24 = 15,600$
- (R) If a school offers 9 different subjects, how many different schedules of 5 classes are possible? $9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 = 15,120$
- (C) In how many different ways can a president, vice president, and secretary be elected from a class of 22 students? $22 \cdot 21 \cdot 20 = 9,240$
- (E) How many different 4-digit numerals are there? (Hint: zero cannot be used as the first digit.) $9 \cdot 10 \cdot 10 \cdot 10 = 9,000$

TITLE: BIG DRIPS

I C I C L E S/A R E
 362,880 9240 362,880 9240 20 9000 720 24 15,120 9000
 E A V E S/D R O P P E R S
 9000 24 90 9000 720 12 15,120 40 15,600 15,600 9000 15,120 720