

A.N.8: Permutations 2: Determine the number of possible arrangements (permutations) of a list of items

- 1 How many different five-digit numbers can be formed from the digits 1, 2, 3, 4, and 5 if each digit is used only once?
 - 1) 120
 - 2) 60
 - 3) 24
 - 4) 20
- 2 A locker combination system uses three digits from 0 to 9. How many different three-digit combinations with no digit repeated are possible?
 - 1) 30
 - 2) 504
 - 3) 720
 - 4) 1,000
- 3 Julia has four different flags that she wants to hang on the wall of her room. How many different ways can the flags be arranged in a row?
 - 1) 1
 - 2) 10
 - 3) 16
 - 4) 24
- 4 How many different 4-letter arrangements can be formed using the letters of the word "JUMP," if each letter is used only once?
 - 1) 24
 - 2) 16
 - 3) 12
 - 4) 4
- 5 How many different 6-letter arrangements can be formed using the letters in the word "ABSENT," if each letter is used only once?
 - 1) 6
 - 2) 36
 - 3) 720
 - 4) 46,656
- 6 How many different two-letter arrangements can be formed using the letters in the word "BROWN"?
 - 1) 10
 - 2) 12
 - 3) 20
 - 4) 25
- 7 What is the total number of different four-letter arrangements that can be formed from the letters in the word "VERTICAL," if each letter is used only once in an arrangement?
 - 1) 8
 - 2) 1,680
 - 3) 6,720
 - 4) 40,320
- 8 There were seven students running in a race. How many different arrangements of first, second, and third place are possible?
- 9 Six members of a school's varsity tennis team will march in a parade. How many different ways can the players be lined up if Angela, the team captain, is always at the front of the line?

- 10 All seven-digit telephone numbers in a town begin with 245. How many telephone numbers may be assigned in the town if the last four digits do *not* begin or end in a zero?
- 11 The telephone company has run out of seven-digit telephone numbers for an area code. To fix this problem, the telephone company will introduce a new area code. Find the number of new seven-digit telephone numbers that will be generated for the new area code if both of the following conditions must be met:
- The first digit cannot be a zero or a one.
 - The first three digits cannot be the emergency number (911) or the number used for information (411).
- 12 A certain state is considering changing the arrangement of letters and numbers on its license plates. The two options the state is considering are:
- Option 1: three letters followed by a four-digit number with repetition of both letters and digits allowed
- Option 2: four letters followed by a three-digit number without repetition of either letters or digits [Zero may be chosen as the first digit of the number in either option.]
- Which option will enable the state to issue more license plates? How many *more* different license plates will that option yield?
- 13 In Jackson County, Wyoming, license plates are made with two letters (A through Z) followed by three digits (0 through 9). The plates are made according to the following restrictions:
- the first letter must be *J* or *W*, and the second letter can be any of the 26 letters in the alphabet
 - no digit can be repeated
- How many different license plates can be made with these restrictions?

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Answer Section

1 ANS: 1

$${}_5P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

PTS: 2 REF: 060016a

2 ANS: 3

$${}_{10}P_3 = 10 \times 9 \times 8 = 720$$

PTS: 2 REF: 010114a

3 ANS: 4

$${}_4P_4 = 4 \times 3 \times 2 \times 1 = 24$$

PTS: 2 REF: 080616a

4 ANS: 1

$${}_4P_4 = 4 \times 3 \times 2 \times 1 = 24$$

PTS: 2 REF: 010013a

5 ANS: 3

$${}_6P_6 = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

PTS: 2 REF: 089917a

6 ANS: 3

$${}_5P_2 = 20$$

PTS: 2 REF: 010925a

7 ANS: 2

$${}_8P_4 = 1680$$

PTS: 2 REF: 060723a

8 ANS:

$$210. {}_7P_3 = 7 \times 6 \times 5 = 210$$

PTS: 2 REF: 060125a

9 ANS:

$$120. 1 \times 5 \times 4 \times 3 \times 2 \times 1 = 120$$

PTS: 2 REF: 010323a

10 ANS:

$$8,100. 9 \times 10 \times 10 \times 9 = 8,100$$

PTS: 2 REF: 060023a

11 ANS:
 $7,980,000. 8 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 - 2(1 \times 1 \times 1 \times 10 \times 10 \times 10 \times 10) = 7980000$

PTS: 4 REF: 080034a

12 ANS:
Option 2 will yield 82,576,000 more possibilities.
Option 1: $26 \times 26 \times 26 \times 10 \times 10 \times 10 \times 10 = 175,760,000$
Option 2: $26 \times 25 \times 24 \times 23 \times 10 \times 9 \times 8 = 258,336,000$

PTS: 3 REF: 060329a

13 ANS:
 $37,440. 2 \times 26 \times 10 \times 9 \times 8 = 37,440$

PTS: 2 REF: 010435a