Fundamental Counting Principle Notes

Fundamental Counting Principle: *If event M can occur in m ways and is followed by event N that can occur in n ways, then event N can occur in m • n ways.*

* the total number of ways to make successive choices

A) Long ago Ford made 3 styles of cars, 2 types of motors, 8 different colors, and 10 different interiors. How many different cars were available?

$3 \times 2 \times 8 \times 10 = 480$

B) The following letters are given {A, B, C, D, E}:
   a. How many 5-letter code words can be made if repetition is allowed?

   $5 \times 5 \times 5 \times 5 \times 5 = 3125$

   b. How many 5-letter code words can be made if repetition is not allowed?

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

C) The following letters are given {A, B, C, D, E}:
   a. How many 3-letter code words can be made if repetition is allowed?

   $5 \times 5 \times 5 = 125$

   b. How many 3-letter code words can be made if repetition is not allowed?

   $5 \times 4 \times 3 = 60$

D) Four people are standing in a line. How many arrangements can be made?

$4 \times 3 \times 2 \times 1 = 24$

E) Eight people would like to have 4 seats at a UK game. How many ways can the people be seated if only 4 people can have a ticket?

$8 \times 7 \times 6 \times 5 = 1680$

F) School lockers have 60 digits to choose from for a 3 digit combination. How many 3 digit combinations are possible?

$60 \times 60 \times 60 = 216{,}000$

G) Taking a trip from Acron to Dayville requires passing through Belfree and Campton. If there are 2 roads from Acron to Belfree, 3 roads from Belfree to Campton, and 10 roads from Campton to Dayville, how many routes are possible?

$2 \times 3 \times 10 = 60$

H) A computer password has 4 letters:

a. How many passwords are possible if repetition is allowed?

$26 \times 26 \times 26 \times 26 = 456,976$

b. How many passwords are possible if repetition is not allowed?

$26 \times 25 \times 24 \times 23 = 358,800$

I) There are 30 different classes that can be taken during the 4 blocks of a school day. How many different student schedules are possible?

* same class can't be taken twice $30 \times 29 \times 28 \times 27 = 657,720$

J) A restaurant menu has combo meals that give you the choice of sandwich: a hotdog or a hamburger, choice of side: chips, fries or onion rings, choice of drink: soda, juice, or tea and choice of dessert: cookie, pie, cake or ice cream. How many possible combo meals could there be?

$2 \times 3 \times 3 \times 4 = 72$

K) How many 3 digit positive numbers are there?

First #: 1-9 possible
2nd #: 0-9
3rd #: 0-9

$9 \times 10 \times 10 = 900$

L) How many 3 digit positive even numbers are there?

same as above, but last number can only be 0, 2, 4, 6, 8

$9 \times 10 \times 5 = 450$

M) The letters O, Q, and I are not used on license plates.

a. For car plates in Kentucky there are 3 numbers followed by 3 letters. How many car plates are possible?

$10 \times 10 \times 10 \times 23 \times 23 \times 23 = 12,167,000$

b. Suppose no repeat letters or numbers could be used on car plates. How many car plates would be possible then?

$10 \times 9 \times 8 \times 23 \times 22 \times 21 = 7,650,720$

c. For truck plates in Kentucky there are 4 numbers followed by 2 letters. How many truck plates are possible?

$10 \times 10 \times 10 \times 10 \times 23 \times 23 = 5,290,000$

N) How many phone numbers (not including the area code) can be used if 1 and 0 can not be the first number in the area code or the prefix number?

$8 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 8,000,000$

a. How many numbers are possible using the area code if 0 and 1 still can not be the first number in the area code or the prefix number?

$8 \times 10 \times 10 \times 8 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 6,400,000,000$

O) A TV station has 4 call letters and W must be the first letter. How many possible call letter arrangements are there?

$1 \times 26 \times 26 \times 26 = 17,576$