Conditions

for the given configuration, determine how many different computer passwords are possible if (a) digits and letters can be repeated, and (b) digits and letters cannot be repeated.
A. 3 digits followed by 4 letters
B. 1 letter followed by 6 digits
C. 2 digits followed by 5 letters
D. 4 letters followed by 4 digits

Solution

(a)

A.

If 3 digits are placed after 4 letters, then we can calculate all possible ways how to construct 4 letters and 3 digits, and then multiply these to results.

4 letters we can take from 26 variants each (from a to z), so the total amount of ways is

$$33 \cdot 33 \cdot 33 \cdot 33$$

3 digits we can take from 10 variants each (from 0 to 9), so the total amount of ways is:

$$10 \cdot 10 \cdot 10$$

Hence, the amount of possible different computer passwords is:

$$33^4 \cdot 10^3 = 1185921000$$

Analogically we can complete the other exercises:

B.

$$33^1 \cdot 10^6 = 33000000$$

C.

$$33^2 \cdot 10^5 = 108900000$$

D.

$$33^4 \cdot 10^4 = 11859210000$$

(b)

When we can't repeat digits and letters, their amount is decreasing on one after each fixed digit or letter. For example, for A we have now:

$33 \cdot 32 \cdot 31 \cdot 30 \cdot 10 \cdot 9 \cdot 8 = 707097600$

B.

$33 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 = 4989600$

C.

$33 \cdot 32 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 = 31933440$

D.

$33 \cdot 32 \cdot 31 \cdot 30 \cdot 10 \cdot 9 \cdot 8 \cdot 7 = 4949683200$