

Bell Work:

A License plate can be made up of 4 digits, each having a possibility the numbers 1-9. And it also has two letters. All numbers and letters can repeat. How many different possible license plates?

$$32 \quad 9 \quad \begin{array}{c} \#\#\# \\ 999 \end{array} \begin{array}{c} AAA \\ 26 \cdot 26 \cdot 26 \end{array} = 12,812,904$$

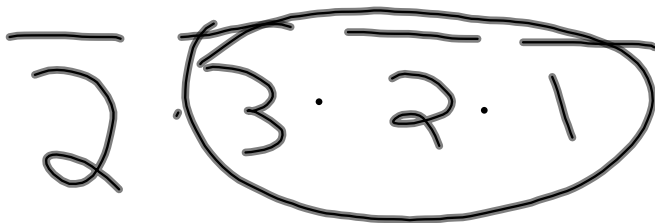
California
 \#\#\#\#AA

$$9 \cdot 9 \cdot 9 \cdot 9 \cdot 26 \cdot 26 = 4,435,236$$

A number is made up of the digits, 7, 6, 2, 3. How many

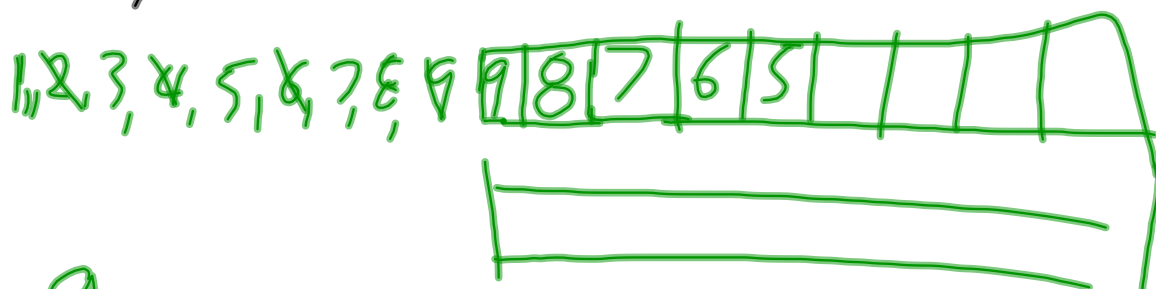
different numbers can be made if we are creating a 4 digit number. And there is no repeating.

The number is less than 6,000



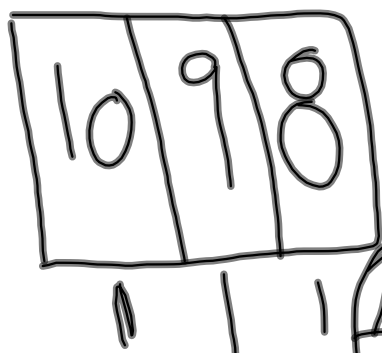
$$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$$

$$7! = 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$



$$9 \times 8 \times 7 \dots = 9!$$

$$P(n, r) = {}_n P_r = \frac{n!}{(n-r)!} = \frac{10!}{(10-3)!}$$



$$\frac{10!}{7!}$$

$$\frac{10 \cdot 9 \cdot 8 \cdot \cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{7} \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}$$

$$43P_3 = \frac{43!}{(43-3)!} = \frac{43!}{40!}$$

$${}_n P_r = \frac{n!}{(n-r)!}$$

$$\frac{43 \cdot 42 \cdot 41 \cdot \cancel{40} \cdot \cancel{39} \cdot \cancel{38} \dots}{\cancel{40} \cdot \cancel{39} \cdot \cancel{38} \dots} P$$

$$43 \cdot 42 \cdot 41 = 74,046$$

Permutations - Order Matters

Combinations of n Objects
 r at a time

$$C(n, r) = {}_n C_r = \frac{n!}{(n-r)!r!}$$

$$C(16, 4) = {}_{16} C_4 = \frac{16!}{(16-4)!4!} =$$

$$\frac{16 \cdot 15 \cdot 14 \cdot 13 \cdot \cancel{12 \cdot 11 \cdot 10 \dots}}{\cancel{(12 \cdot 11 \cdot 10 \dots)} (4 \cdot 3 \cdot 2 \cdot 1)} = 1,820$$

$$\frac{16 \cdot 15 \cdot 14 \cdot 13}{4 \cdot 3 \cdot 2 \cdot 1}$$