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 2 ###AAA = 12,812,904

999 26·26·26

California

####AA

4,435,236

$9 \cdot 9 \cdot 9 \cdot 9 \cdot 26 \cdot 26 =$

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

$\underline{2} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1}$

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

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

$\cancel{1}, \cancel{2}, \cancel{3}, \cancel{4}, \cancel{5}, \cancel{6}, \cancel{7}, \cancel{8}, \cancel{9}$ | 9 | 8 | 7 | 6 | 5 | | | |

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

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

| 10 | 9 | 8 |

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

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

$$ {}_{43}P_3 = \frac{43!}{(43-3)!} = \frac{43!}{40!} \qquad {}_nP_r = \frac{n!}{(n-r)!} $$

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

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

Permutations - Order Matters

Combinations of n Objects r at a time

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

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

$$\frac{16\cdot15\cdot14\cdot13\cdot\cancel{12\cdot11\cdot10\cdots}}{(\cancel{12\cdot11\cdot10\cdots})(4\cdot3\cdot2\cdot1)} \qquad 1,820$$

$$\frac{16\cdot15\cdot14\cdot13}{4\cdot3\cdot2\cdot1}$$