

Example 4

Two parents take 5 children to the movies. In how many ways can they be seated in a row if there must be a parent at both ends?

Parents
 (76) 5 4 3 2 1

$$\begin{array}{ccccccccc}
 P & & 5 & 4 & 3 & 2 & 1 & P & \\
 2 & & & & & & & & 1
 \end{array}$$

$$2 \times 5! \times 1$$

$$= 240$$

Example 5

How many three-digit passcodes can be created using digits from 1 through 9, without repetition, if the first digit must be 7?

$$\begin{array}{ccccccccc}
 & 9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 \\
 7 & 9 & 8 & 6 & 5 & 4 & 3 & 2 & 1 & \\
 1 & \times & 8 & \times & 7 & & & & &
 \end{array}$$

$$= 56$$

Example 6

How many four-digit even numbers can be created using the digits 1, 2, 3, 4, and 5, if repetition of digits is not allowed?

Repetition
NOT Allowed

ends with 2 or 4

$$4 \times 3 \times 2 \times \textcircled{2}$$

$$= 48$$

even 2, 4

Example 7

How many four-digit even numbers can be created using the digits 1, 2, 3, 4, and 5, if repetition of digits is allowed?

Repetition allowed:

$$5 \quad 5 \quad 5 \quad \frac{2}{\text{even}}$$

$$= 250 \text{ ways}$$