Lesson 4-6

Example 1

How many different "words" can be made with the letters l, m, n, o, p, and q if all the letters are used?
(The words do not have to make sense in English or any other language.)

Solution

Find the number of permutations of six letters.

number of permutations = 6! = 6 · 5 · 4 · 3 · 2 · 1 = 720

There are 720 different "words" that can be made using six letters.

Example 2

How many different "words" can be made with the letters l, m, n, o, p, and q if only three different letters are used in each word?

Solution

There are six letters to be taken three at a time. So $n = 6$ and $r = 3$ in the permutation formula.

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

$$_6P_3 = \frac{6!}{(6 - 3)!}$$

$$= \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1}$$

$$= 120$$

There are 120 "words" that can be made.

Example 3

HEALTH There are 6 runners in a race at school: Martin, Joey, Enrique, Sam, Carl, and James. In how many different ways can the runners finish in first, second, third, and fourth place?

Solution

There are six runners in the race who will be taken four at a time. So $n = 6$ and $r = 4$ in the permutation formula.

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

$$_6P_4 = \frac{6!}{(6 - 4)!}$$

$$= \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1}$$

$$= 360$$

There are 360 ways the six runners can finish in first, second, third, and fourth place.