In How Many Ways Can 5 Books Be Arranged on a Shelf?

\[
5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120
\]

\[
\frac{5!}{1!}
\]
New Trick for an Old Dog -

When computing the number of arrangements of certain objects, we are actually talking about permutations. And now the definition:

**Permutation** – a sequential arrangement of \( n \) distinct objects taken \( r \) at a time. It is usually denoted by \( nP_r \), in which the order makes a difference.

**Formula** – when taking \( n \) objects \( r \) at a time, use the formula below:

\[
P_r = \frac{n!}{(n-r)!}
\]

\[
5P_5 = \frac{5!}{(5-5)!} = \frac{5!}{0!} = \frac{5}{1} = 120
\]
Together Problems –

1. In how many ways can the letters j, o, k, e be arranged in four letter arrangements if any letter is not repeated?

Solution:

\[ 4 \text{P}_4 \overset{\ _4}{\_4} = \frac{4!}{(4-4)!} = \frac{4!}{0!} = \frac{4!}{1} = 24 \]
2. In how many ways can 5 people line up at a single stadium ticket window?

Solution:

\[ P_5^5 = \frac{5!}{(5-5)!} = \frac{5!}{0!} = \frac{5!}{1} = 120 \]
3. How many arrangements can be made using 3 of the letters of the word DOLPHIN if any letter is not repeated?

Solution:

\[
P_7^3 = \frac{7!}{(7-3)!} = \frac{7!}{4!} = \frac{7 \cdot 6 \cdot 5 \cdot 4!}{4!} = 7 \cdot 6 \cdot 5
\]

\[\therefore 210\]
4. A team has 6 players but only four empty lockers in the gym. In how many ways can
the coach assign these lockers to the players, assuming the lockers may not be used
by more than one player?

Solution:

\[
P_4 = \frac{6!}{(6-4)!} = \frac{6!}{2!} = \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1} = 360
\]
Can also be done using the Power of the Nspire...

Press Menu, 5:Probability, 2:Permutations
*Pass Out Practice Problems

29) \( \binom{3}{3} = 6 \)

39) \( \binom{5}{5} = 120 \)