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Permutations Video

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- Welcome again, everyone.
In this sequence of lectures
we're going to talk about
combinatorics,
which basically are
somewhat
more advanced ways of
counting structures.
And we'll start talking by
talking about permutations.
So a permutation is an



4.1 Combinatorics Permutations

General comment

Unless other stated, in this and subsequent sections, the following are assumed to be different (distinguishable):

People (including, men, women, children, soccer players, etc.)

Orientations (left to right or right to left)

Rotations (around a circle)

POLL

How many permutations does the set $\{1,2,3,4\}$ have?

RESULTS

- | | |
|-------------------------------------|-----|
| <input checked="" type="radio"/> 24 | 99% |
| <input type="radio"/> 36 | 1% |
| <input type="radio"/> 9 | 0% |
| <input type="radio"/> 18 | 0% |

Submit

Results gathered from 411 respondents.

FEEDBACK

$4! = 24$

1

0 points possible (ungraded)

$0! =$

☐ 0

☒ 1 ✓

☐ ∞

☐ undefined

Submit

You have used 1 of 2 attempts

i Answers are displayed within the problem

2

0 points possible (ungraded)

Which of the following are true for all $n, m \in \mathbb{N}$ and $n \geq 1$.

☒ $n! = n \cdot (n - 1)!$ ✓

☐ $(n \cdot m)! = n! \cdot m!$

☐ $(n + m)! = n! + m!$

☐ $(n^m)! = (n!)^m$



Submit

You have used 3 of 4 attempts

i Answers are displayed within the problem

3

0 points possible (ungraded)

In how many ways can 11 soccer players form a line before a game?

☐ 11☐ 11^2 ☒ $11!$ ✓☐ None of the above

Submit

You have used 1 of 2 attempts

4

2.0/2.0 points (graded)

In how many ways can 8 identical rooks be placed on an 8×8 chessboard so that none can capture any other, namely no row and no column contains more than one rook?

40320



40320

Submit

You have used 2 of 4 attempts

5

0 points possible (ungraded)

In how many ways can 8 distinguishable rooks be placed on an 8×8 chessboard so that none can capture any other, namely no row and no column contains more than one rook?

For example, in a 2×2 chessboard, you can place 2 rooks labeled 'a' and 'b' in 4 ways. There are 4 locations to place 'a', and that location determines the location of 'b'.

1625702400



1625702400

Submit

You have used 4 of 4 attempts

6

0 points possible (ungraded)

In how many ways can 7 men and 7 women can sit around a table so that men and women alternate. Assume that all rotations of a configuration are identical hence counted as just one.

177811200

 **Answer: 3628800**

177811200

Explanation

When rotations don't matter, there are $6!$ ways to seat the women. For each such configuration, there are $7!$ ways to seat the men. The total number of configurations is therefore $6! \cdot 7! = 3,628,800$.

Submit

You have used 4 of 4 attempts

i Answers are displayed within the problem

7

4.0/4.0 points (graded)

In how many ways can three couples be seated in a row so that each couple sits together (namely next to each other):

- in a row,

48

✓ Answer: 48

48

Explanation

There are $3!$ ways to decide on the order of the couples, and then 2^3 ways to determine the order for each couple, hence a total of $3! \cdot 2^3 = 48$ ways.

- in a circle?

96

✓ Answer: 96

96

Explanation

Configuration where the mark is between two couples correspond to configurations in a row, hence there are $3! \cdot 2^3 = 48$ of them. Furthermore each circular shift of such a configuration results in one where the mark separates two members of the same couple. Hence there are also 48 such configurations, and the total number of configurations is $48 \cdot 2 = 96$.

You have used 3 of 4 attempts

Submit

i Answers are displayed within the problem

Discussion

















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