Permutations, Combinations and Binomial Probability

Number of permutations and combinations of r items from n, and the binomial probabilities of exactly r and at most r successes in n trials.

Method: Counting rules and the binomial distribution (Kreyszig, Advanced Engineering Mathematics, 10th ed. (Wiley), ch. 24)

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of items or trials	10.000	
Number chosen or successes	3.0000	
Probability of success in one trial	10.000	%

Calculated results

Parameter	Value	Unit
Permutations	720.00	
Combinations	120.00	
Probability of exactly r	5.7396	%
Probability of at most r	98.720	%

Notes for this case

- Inputs are rounded to whole numbers. Large counts are computed through logarithms and shown to about 12 significant figures.

Formula and method

$$ {}^{n}P_{r} = \frac{n!}{(n-r)!}, \quad {}^{n}C_{r} = \frac{n!}{r!\,(n-r)!}, \quad P(X=r) = {}^{n}C_{r} p^{r} (1-p)^{n-r} $$

Variables

n	Number of items or trials	-
r	Number chosen or successes	-
p	Probability of success in one trial	-
${}^{n}P_{r}$	Permutations	-
${}^{n}C_{r}$	Combinations	-
$P(X=r)$	Probability of exactly r	-
$P(X \le r)$	Probability of at most r	-

Method and standards

Counting and binomial.

Assumptions and limits

- Independent trials; constant p.

References

- Counting rules and the binomial distribution (Kreyszig, Advanced Engineering Mathematics, 10th ed. (Wiley), ch. 24)

Report details

Report reference	FCC-9X63-28A9 (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/general/geometry/permutations-combinations-binomial

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.