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Probability, addition and multiplication theorems

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Classical probability	P(A) = n(A)/n(S) Valid when: finite sample space of equally likely outcomes	pure number, 0 to 1
Complement	P(not A) = 1 - P(A) Valid when: any event A	pure number
Addition theorem	P(A or B) = P(A) + P(B) - P(A and B) Valid when: any two events A and B	pure number
Three events	sum of singles - sum of pairs + P(A and B and C) Valid when: any three events A, B, C	pure number
Exactly one of A, B	P(A) + P(B) - 2 P(A and B)	pure number
Conditional probability	P(B | A) = P(A and B)/P(A) Valid when: P(A) > 0	pure number
Multiplication theorem	P(A and B) = P(A) P(B | A) Valid when: any events A, B with P(A) > 0	pure number
Independence	P(A and B) = P(A) P(B) Valid when: only for independent events	pure number
At least one of n independent events	1 - (1 - p1)(1 - p2)...(1 - pn) Valid when: the events are independent with probabilities p1..pn	pure number
First success on trial k	q^(k-1) p; first player wins alternate game with p/(1 - q^2) Valid when: independent trials, same success chance p each; both players have p	pure number

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/statistics-and-probability/probability-addition-and-multiplication-the

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