

MATHEMATICS · JEE MAIN

Binomial Theorem

Chapter-wise previous year questions, with answer key

161

PYQS

2020–2025

PAPERS

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TOPICS

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- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

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Binomial Expansion · 22 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

The number of integral terms in the expansion of $\left(5^{\frac{1}{2}} + 7^{\frac{1}{8}}\right)^{1016}$ is:

- (A) 127
- (B) 128
- (C) 130
- (D) 129

[Step-by-step solution ► prepwiser.in/questions/2OXhFSv3K5](https://www.prepwiser.in/questions/2OXhFSv3K5)

Q2 JEE Main 2025 · 4 Apr · Shift 1

For an integer $n \geq 2$, if the arithmetic mean of all coefficients in the binomial expansion of $(x + y)^{2n-3}$ is 16, then the distance of the point P $(2n - 1, n^2 - 4n)$ from the line $x + y = 8$ is

- (A) $\sqrt{2}$
- (B) $2\sqrt{2}$
- (C) $5\sqrt{2}$
- (D) $3\sqrt{2}$

[Step-by-step solution ► prepwiser.in/questions/V2N6rXSO47](https://www.prepwiser.in/questions/V2N6rXSO47)

Q3 JEE Main 2025 · 3 Apr · Shift 1

The sum of all rational terms in the expansion of $(2 + \sqrt{3})^8$ is :

- (A) 16923
- (B) 18817
- (C) 3763
- (D) 33845

[Step-by-step solution ► prepwiser.in/questions/jete5GhbDr](https://www.prepwiser.in/questions/jete5GhbDr)

Q4 JEE Main 2025 · 22 Jan · Shift 2

Let α, β, γ and δ be the coefficients of x^7, x^5, x^3 and x respectively in the expansion of

$$\left(x + \sqrt{x^3 - 1}\right)^5 + \left(x - \sqrt{x^3 - 1}\right)^5, x > 1. \text{ If } u \text{ and } v \text{ satisfy the equations}$$

$$\alpha u + \beta v = 18,$$

$$\gamma u + \delta v = 20,$$

then $u + v$ equals :

- (A) 4
- (B) 3
- (C) 5
- (D) 8

[Step-by-step solution ► prepwiser.in/questions/ugqmUydTyU](https://www.prepwiser.in/questions/ugqmUydTyU)

Q5 JEE Main 2024 · 6 Apr · Shift 1

If the second, third and fourth terms in the expansion of $(x + y)^n$ are 135, 30 and $\frac{10}{3}$, respectively, then $6(n^3 + x^2 + y)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/F5mYgU0hGB](https://www.prepwiser.in/questions/F5mYgU0hGB)

Q6 JEE Main 2024 · 5 Apr · Shift 2

If the constant term in the expansion of $\left(\frac{\sqrt[5]{3}}{x} + \frac{2x}{\sqrt[5]{5}}\right)^{12}$, $x \neq 0$, is $\alpha \times 2^8 \times \sqrt[5]{3}$, then 25α is equal to :

- (A) 724 (B) 742
(C) 693 (D) 639

[Step-by-step solution ► prepwisar.in/questions/SKJaL-Q0mx](https://www.prepwisar.in/questions/SKJaL-Q0mx)

Q7 JEE Main 2024 · 31 Jan · Shift 2

Let the coefficient of x^r in the expansion of

$$(x+3)^{n-1} + (x+3)^{n-2}(x+2) + (x+3)^{n-3}(x+2)^2 + \dots + (x+2)^{n-1}$$

be α_r . If $\sum_{r=0}^n \alpha_r = \beta^n - \gamma^n$, $\beta, \gamma \in \mathbb{N}$, then the value of $\beta^2 + \gamma^2$ equals _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/4VRJe2337h](https://www.prepwisar.in/questions/4VRJe2337h)

Q8 JEE Main 2024 · 31 Jan · Shift 1

In the expansion of

$$(1+x)(1-x^2)\left(1+\frac{3}{x}+\frac{3}{x^2}+\frac{1}{x^3}\right)^5, x \neq 0$$

, the sum of the coefficients of x^3 and x^{-13} is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/ZbZSXCfFLT](https://www.prepwisar.in/questions/ZbZSXCfFLT)

Q9 JEE Main 2024 · 27 Jan · Shift 1

If A denotes the sum of all the coefficients in the expansion of $(1-3x+10x^2)^n$ and B denotes the sum of all the coefficients in the expansion of $(1+x^2)^n$, then :

- (A) $B = A^3$ (B) $3A = B$
(C) $A = 3B$ (D) $A = B^3$

[Step-by-step solution ► prepwisar.in/questions/irOEFxHBaK](https://www.prepwisar.in/questions/irOEFxHBaK)

Q10 JEE Main 2023 · 15 Apr · Shift 1

If the sum of the series

$$\left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{2^2} - \frac{1}{2 \cdot 3} + \frac{1}{3^2}\right) + \left(\frac{1}{2^3} - \frac{1}{2^2 \cdot 3} + \frac{1}{2 \cdot 3^2} - \frac{1}{3^3}\right) +$$

$$\left(\frac{1}{2^4} - \frac{1}{2^3 \cdot 3} + \frac{1}{2^2 \cdot 3^2} - \frac{1}{2 \cdot 3^3} + \frac{1}{3^4}\right) + \dots$$

is $\frac{\alpha}{\beta}$, where α and β are co-prime, then $\alpha + 3\beta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/SfTkm_Q-Pv](https://www.prepwisar.in/questions/SfTkm_Q-Pv)

Q11 JEE Main 2023 · 12 Apr · Shift 1

The sum, of the coefficients of the first 50 terms in the binomial expansion of $(1 - x)^{100}$, is equal to

(A) ${}^{99}C_{49}$

(B) ${}^{101}C_{50}$

(C) $-{}^{99}C_{49}$

(D) $-{}^{101}C_{50}$

[Step-by-step solution ► prepwiser.in/questions/kip4fMz_61](https://www.prepwiser.in/questions/kip4fMz_61)

Q12 JEE Main 2023 · 11 Apr · Shift 1

The mean of the coefficients of $x, x^2, \dots, x^7$ in the binomial expansion of $(2 + x)^9$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/loPhwGs9Cj](https://www.prepwiser.in/questions/loPhwGs9Cj)

Q13 JEE Main 2023 · 10 Apr · Shift 2

If the coefficients of x and x^2 in $(1 + x)^p(1 - x)^q$ are 4 and -5 respectively, then $2p + 3q$ is equal to :

(A) 66

(B) 60

(C) 69

(D) 63

[Step-by-step solution ► prepwiser.in/questions/TR466t234y](https://www.prepwiser.in/questions/TR466t234y)

Q14 JEE Main 2023 · 1 Feb · Shift 1

The remainder, when $19^{200} + 23^{200}$ is divided by 49, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/E5haFPeaj](https://www.prepwiser.in/questions/E5haFPeaj)

Q15 JEE Main 2022 · 27 Jun · Shift 2

If the sum of the coefficients of all the positive powers of x , in the Binomial expansion of $(x^n + \frac{2}{x^5})^7$ is 939, then the sum of all the possible integral values of n is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/U_nuSJAeAa](https://www.prepwiser.in/questions/U_nuSJAeAa)

Q16 JEE Main 2021 · 25 Jul · Shift 2

If the co-efficient of x^7 and x^8 in the expansion of $(2 + \frac{x}{3})^n$ are equal, then the value of n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/R8yFcGP_x8](https://www.prepwiser.in/questions/R8yFcGP_x8)

Q17 JEE Main 2021 · 16 Mar · Shift 2

Let n be a positive integer. Let

$$A = \sum_{k=0}^n (-1)^k C_k \left[\left(\frac{1}{2}\right)^k + \left(\frac{3}{4}\right)^k + \left(\frac{7}{8}\right)^k + \left(\frac{15}{16}\right)^k + \left(\frac{31}{32}\right)^k \right]$$

. If

$63A = 1 - \frac{1}{2^{30}}$, then n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ykoClpiMM5](https://www.prepwiser.in/questions/ykoClpiMM5)

Q18 JEE Main 2020 · 6 Sep · Shift 1

If $\{p\}$ denotes the fractional part of the number p , then

$\left\{\frac{3^{200}}{8}\right\}$, is equal to :

(A) $\frac{5}{8}$

(B) $\frac{7}{8}$

(C) $\frac{1}{8}$

(D) $\frac{3}{8}$

[Step-by-step solution ► prepwiser.in/questions/cKivdP9BY5](https://www.prepwiser.in/questions/cKivdP9BY5)

Q19 JEE Main 2020 · 6 Sep · Shift 2

If the constant term in the binomial expansion of

$\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405, then $|k|$ equals :

(A) 3

(B) 9

(C) 1

(D) 2

[Step-by-step solution ► prepwiser.in/questions/IZOQ7LbcPw](https://www.prepwiser.in/questions/IZOQ7LbcPw)

Q20 JEE Main 2020 · 5 Sep · Shift 1

If $2^{10} + 2^9 \cdot 3^1 + 2^8 \cdot 3^2 + \dots + 2 \cdot 3^9 + 3^{10} = S - 2^{11}$, then S is equal to :

(A) $\frac{3^{11}}{2} + 2^{10}$

(B) $3^{11} - 2^{12}$

(C) $2 \cdot 3^{11}$

(D) 3^{11}

[Step-by-step solution ► prepwiser.in/questions/SePwy8OUcm](https://www.prepwiser.in/questions/SePwy8OUcm)

Q21 JEE Main 2020 · 8 Jan · Shift 2

If α and β be the coefficients of x^4 and x^2 respectively in the expansion of

$$\left(x + \sqrt{x^2 - 1}\right)^6 + \left(x - \sqrt{x^2 - 1}\right)^6$$

, then

(A) $\alpha + \beta = 60$

(B) $\alpha - \beta = 60$

(C) $\alpha + \beta = -30$

(D) $\alpha - \beta = -132$

[Step-by-step solution ► prepwiser.in/questions/MUftPQDMc4](https://www.prepwiser.in/questions/MUftPQDMc4)

Q22 JEE Main 2020 · 7 Jan · Shift 2

The coefficient of x^7 in the expression

$(1+x)^{10} + x(1+x)^9 + x^2(1+x)^8 + \dots + x^{10}$ is:

(A) 120

(B) 330

(C) 420

(D) 210

[Step-by-step solution](https://www.prepwiser.in/questions/sOp02YtvuO) ► [prepwiser.in/questions/sOp02YtvuO](https://www.prepwiser.in/questions/sOp02YtvuO)

General Term · 26 PYQs

Q23 JEE Main 2025 · 2 Apr · Shift 1

The term independent of x in the expansion of $\left(\frac{(x+1)}{(x^{2/3}+1-x^{1/3})} - \frac{(x-1)}{(x-x^{1/2})}\right)^{10}$, $x > 1$, is :

(A) 240

(B) 120

(C) 150

(D) 210

[Step-by-step solution](https://www.prepwiser.in/questions/uiSr6cavsN) ► [prepwiser.in/questions/uiSr6cavsN](https://www.prepwiser.in/questions/uiSr6cavsN)

Q24 JEE Main 2025 · 29 Jan · Shift 1

The least value of n for which the number of integral terms in the Binomial expansion of $(\sqrt[3]{7} + \sqrt[12]{11})^n$ is 183, is :

(A) 2184

(B) 2172

(C) 2196

(D) 2148

[Step-by-step solution](https://www.prepwiser.in/questions/toPoqyVmsR) ► [prepwiser.in/questions/toPoqyVmsR](https://www.prepwiser.in/questions/toPoqyVmsR)

Q25 JEE Main 2024 · 8 Apr · Shift 2

If the term independent of x in the expansion of $(\sqrt{a}x^2 + \frac{1}{2x^3})^{10}$ is 105, then a^2 is equal to :

(A) 6

(B) 4

(C) 2

(D) 9

[Step-by-step solution](https://www.prepwiser.in/questions/VVWH0-oOhy) ► [prepwiser.in/questions/VVWH0-oOhy](https://www.prepwiser.in/questions/VVWH0-oOhy)

Q26 JEE Main 2024 · 5 Apr · Shift 1

If the constant term in the expansion of $(1 + 2x - 3x^3)(\frac{3}{2}x^2 - \frac{1}{3x})^9$ is p , then $108p$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](https://www.prepwiser.in/questions/g7JYLNjrgO) ► [prepwiser.in/questions/g7JYLNjrgO](https://www.prepwiser.in/questions/g7JYLNjrgO)

Q27 JEE Main 2024 · 30 Jan · Shift 1

Number of integral terms in the expansion of $\left\{7\left(\frac{1}{2}\right) + 11\left(\frac{1}{6}\right)\right\}^{824}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](https://www.prepwiser.in/questions/M1HP5jYCLL) ► [prepwiser.in/questions/M1HP5jYCLL](https://www.prepwiser.in/questions/M1HP5jYCLL)

Q28 JEE Main 2023 · 13 Apr · Shift 2

The coefficient of x^5 in the expansion of $(2x^3 - \frac{1}{3x^2})^5$ is :

(A) $\frac{26}{3}$

(B) $\frac{80}{9}$

(C) 9

(D) 8

[Step-by-step solution ► prepwiser.in/questions/H9426REIbf](https://www.prepwiser.in/questions/H9426REIbf)

Q29 JEE Main 2023 · 8 Apr · Shift 1

Let $[t]$ denote the greatest integer $\leq t$. If the constant term in the expansion of $(3x^2 - \frac{1}{2x^5})^7$ is α , then $[\alpha]$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/L-VFoPzkOq](https://www.prepwiser.in/questions/L-VFoPzkOq)

Q30 JEE Main 2023 · 8 Apr · Shift 1

If the coefficients of three consecutive terms in the expansion of $(1+x)^n$ are in the ratio 1 : 5 : 20, then the coefficient of the fourth term is

(A) 3654

(B) 1827

(C) 5481

(D) 2436

[Step-by-step solution ► prepwiser.in/questions/cS5mN_vXex](https://www.prepwiser.in/questions/cS5mN_vXex)

Q31 JEE Main 2023 · 6 Apr · Shift 1

The coefficient of x^{18} in the expansion of $(x^4 - \frac{1}{x^3})^{15}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ZJ6OV07ScM](https://www.prepwiser.in/questions/ZJ6OV07ScM)

Q32 JEE Main 2023 · 6 Apr · Shift 2

If the coefficient of x^7 in $(ax^2 + \frac{1}{2bx})^{11}$ and x^{-7} in $(ax - \frac{1}{3bx^2})^{11}$ are equal, then :

(A) $243ab = 64$

(B) $32ab = 729$

(C) $64ab = 243$

(D) $729ab = 32$

[Step-by-step solution ► prepwiser.in/questions/mrxr9nRZHp](https://www.prepwiser.in/questions/mrxr9nRZHp)

Q33 JEE Main 2023 · 1 Feb · Shift 2

If the term without x in the expansion of $(x^{\frac{2}{3}} + \frac{\alpha}{x^3})^{22}$ is 7315, then $|\alpha|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/or-pNkGGwY](https://www.prepwiser.in/questions/or-pNkGGwY)

Q34 JEE Main 2023 · 31 Jan · Shift 2

The coefficient of x^{-6} , in the

expansion of $(\frac{4x}{5} + \frac{5}{2x^2})^9$, is

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Eyrk_cD2Nb](https://www.prepwiser.in/questions/Eyrk_cD2Nb)

Q35 JEE Main 2023 · 31 Jan · Shift 1

Let $\alpha > 0$, be the smallest number such that the expansion of $\left(x^{\frac{2}{3}} + \frac{2}{x^3}\right)^{30}$ has a term $\beta x^{-\alpha}$, $\beta \in \mathbb{N}$. Then α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/BcPtPr5EhJ](https://www.prepwisar.in/questions/BcPtPr5EhJ)

Q36 JEE Main 2023 · 29 Jan · Shift 1

If the co-efficient of x^9 in $\left(\alpha x^3 + \frac{1}{\beta x}\right)^{11}$ and the co-efficient of x^{-9} in $\left(\alpha x - \frac{1}{\beta x^3}\right)^{11}$ are equal, then $(\alpha\beta)^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/iIMM_Yqd5B](https://www.prepwisar.in/questions/iIMM_Yqd5B)

Q37 JEE Main 2023 · 24 Jan · Shift 2

Let the sum of the coefficients of the first three terms in the expansion of $\left(x - \frac{3}{x^2}\right)^n$, $x \neq 0, n \in \mathbb{N}$, be 376. Then the coefficient of x^4 is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/xXSPIwMGx7](https://www.prepwisar.in/questions/xXSPIwMGx7)

Q38 JEE Main 2022 · 29 Jun · Shift 2

Let the coefficients of x^{-1} and x^{-3} in the expansion of $\left(2x^{\frac{1}{5}} - \frac{1}{x^{\frac{1}{5}}}\right)^{15}$, $x > 0$, be m and n respectively. If r is a positive integer such that $mn^2 = {}^{15}C_r \cdot 2^r$, then the value of r is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/te1gC4uc-W](https://www.prepwisar.in/questions/te1gC4uc-W)

Q39 JEE Main 2022 · 28 Jun · Shift 1

The number of positive integers k such that the constant term in the binomial expansion of $\left(2x^3 + \frac{3}{x^k}\right)^{12}$, $x \neq 0$ is $2^8 \cdot l$, where l is an odd integer, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/GSvJgujt00](https://www.prepwisar.in/questions/GSvJgujt00)

Q40 JEE Main 2022 · 27 Jun · Shift 1

If the coefficient of x^{10} in the binomial expansion of

$$\left(\frac{\sqrt{x}}{5^{\frac{1}{4}}} + \frac{\sqrt{5}}{x^{\frac{1}{3}}}\right)^{60}$$

is $5^k \cdot l$, where $l, k \in \mathbb{N}$ and l is co-prime to 5, then k is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/bQ3S5S9NBg](https://www.prepwisar.in/questions/bQ3S5S9NBg)

Q41 JEE Main 2021 · 31 Aug · Shift 1

If $\left(\frac{3^6}{4^4}\right)k$ is the term, independent of x , in the binomial expansion of $\left(\frac{x}{4} - \frac{12}{x^2}\right)^{12}$, then k is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/21zSOJ8vid](https://www.prepwiser.in/questions/21zSOJ8vid)

Q42 JEE Main 2021 · 27 Jul · Shift 1

If the coefficients of x^7 in $\left(x^2 + \frac{1}{bx}\right)^{11}$ and x^{-7} in $\left(x - \frac{1}{bx^2}\right)^{11}$, $b \neq 0$, are equal, then the value of b is equal to :

- (A) 2 (B) -1
(C) 1 (D) -2

[Step-by-step solution ► prepwiser.in/questions/4-LReEK6uW](https://www.prepwiser.in/questions/4-LReEK6uW)

Q43 JEE Main 2021 · 25 Jul · Shift 2

The sum of all those terms which are rational numbers in the

expansion of $(2^{1/3} + 3^{1/4})^{12}$ is :

- (A) 89 (B) 27
(C) 35 (D) 43

[Step-by-step solution ► prepwiser.in/questions/7J52Er_ijY](https://www.prepwiser.in/questions/7J52Er_ijY)

Q44 JEE Main 2021 · 22 Jul · Shift 2

If the constant term, in binomial expansion of $(2x^r + \frac{1}{x^2})^{10}$ is 180, then r is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/APSHajcGLV](https://www.prepwiser.in/questions/APSHajcGLV)

Q45 JEE Main 2021 · 20 Jul · Shift 1

The number of rational terms in the binomial expansion of $\left(4^{\frac{1}{4}} + 5^{\frac{1}{6}}\right)^{120}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/88BkdtFpEB](https://www.prepwiser.in/questions/88BkdtFpEB)

Q46 JEE Main 2021 · 17 Mar · Shift 2

Let the coefficients of third, fourth and fifth terms in the expansion of $\left(x + \frac{a}{x^2}\right)^n$, $x \neq 0$, be in the ratio 12 : 8 : 3. Then the term independent of x in the expansion, is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/M6Ucfm2pb-](https://www.prepwiser.in/questions/M6Ucfm2pb-)

Q47 JEE Main 2020 · 5 Sep · Shift 1

The natural number m , for which the coefficient of x in the binomial expansion of

$\left(x^m + \frac{1}{x^2}\right)^{22}$ is 1540, is

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UHt7BhCGMA](https://www.prepwiser.in/questions/UHt7BhCGMA)

Q48 JEE Main 2020 · 3 Sep · Shift 2

If the term independent of x in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$ is k , then $18k$ is equal to :

- (A) 5 (B) 9
(C) 7 (D) 11

[Step-by-step solution ► prepwisser.in/questions/2M92itbdAh](https://www.prepwisser.in/questions/2M92itbdAh)

Middle Term · 3 PYQs

Q49 JEE Main 2022 · 28 Jul · Shift 2

Let the coefficients of the middle terms in the expansion of $\left(\frac{1}{\sqrt{6}} + \beta x\right)^4$, $(1 - 3\beta x)^2$ and $\left(1 - \frac{\beta}{2}x\right)^6$, $\beta > 0$, respectively form the first three terms of an A.P. If d is the common difference of this A.P., then $50 - \frac{2d}{\beta^2}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/M-33pUM8S6](https://www.prepwisser.in/questions/M-33pUM8S6)

Q50 JEE Main 2021 · 25 Jul · Shift 1

The ratio of the coefficient of the middle term in the expansion of $(1 + x)^{20}$ and the sum of the coefficients of two middle terms in expansion of $(1 + x)^{19}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/tKV4a406pd](https://www.prepwisser.in/questions/tKV4a406pd)

Q51 JEE Main 2021 · 26 Feb · Shift 1

The maximum value of the term independent of ' t ' in the expansion of

$$\left(tx^{\frac{1}{5}} + \frac{(1-x)^{\frac{1}{10}}}{t}\right)^{10}$$

where $x \in (0, 1)$ is :

- (A) $\frac{10!}{\sqrt{3}(5!)^2}$ (B) $\frac{2 \cdot 10!}{3\sqrt{3}(5!)^2}$
(C) $\frac{10!}{3(5!)^2}$ (D) $\frac{2 \cdot 10!}{3(5!)^2}$

[Step-by-step solution ► prepwisser.in/questions/LN0CjNFUnz](https://www.prepwisser.in/questions/LN0CjNFUnz)

Applications of Binomial Theorem · 18 PYQs

Q52 JEE Main 2025 · 7 Apr · Shift 1

The remainder when $\left((64)^{(64)}\right)^{(64)}$ is divided by 7 is equal to

- (A) 4 (B) 6
(C) 3 (D) 1

[Step-by-step solution ► prepwisser.in/questions/jL4fVHJn-S](https://www.prepwisser.in/questions/jL4fVHJn-S)

Q53 JEE Main 2025 · 3 Apr · Shift 1

If $\sum_{r=1}^9 \binom{r+3}{2^r} \cdot {}^9C_r = \alpha \left(\frac{3}{2}\right)^9 - \beta, \alpha, \beta \in \mathbb{N}$, then $(\alpha + \beta)^2$ is equal to

- (A) 27 (B) 81
(C) 18 (D) 9

[Step-by-step solution ► prepwisser.in/questions/55C9tl-Cx6](https://www.prepwisser.in/questions/55C9tl-Cx6)

Q54 JEE Main 2025 · 2 Apr · Shift 1

The largest $n \in \mathbb{N}$ such that 3^n divides $50!$ is :

- (A) 22 (B) 20
(C) 21 (D) 23

[Step-by-step solution ► prepwisser.in/questions/fPqcq3qCsJ](https://www.prepwisser.in/questions/fPqcq3qCsJ)

Q55 JEE Main 2023 · 13 Apr · Shift 1

Let α be the constant term in the binomial expansion of $\left(\sqrt{x} - \frac{6}{x^{\frac{1}{2}}}\right)^n, n \leq 15$. If the sum of the coefficients of the remaining terms in the expansion is 649 and the coefficient of x^{-n} is $\lambda\alpha$, then λ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/Nn16MjTUx1](https://www.prepwisser.in/questions/Nn16MjTUx1)

Q56 JEE Main 2023 · 12 Apr · Shift 1

If

$$\frac{1}{n+1} {}^nC_n + \frac{1}{n} {}^nC_{n-1} + \dots + \frac{1}{2} {}^nC_1 + {}^nC_0 = \frac{1023}{10}$$

then n is equal to :

- (A) 9 (B) 6
(C) 7 (D) 8

[Step-by-step solution ► prepwisser.in/questions/weBR0cPBkn](https://www.prepwisser.in/questions/weBR0cPBkn)

Q57 JEE Main 2023 · 8 Apr · Shift 1

The largest natural number n such that 3^n divides $66!$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/rYDwyOb9VM](https://www.prepwisser.in/questions/rYDwyOb9VM)

Q58 JEE Main 2023 · 6 Apr · Shift 2

If

$$(20)^{19} + 2(21)(20)^{18} + 3(21)^2(20)^{17} + \dots + 20(21)^{19} = k(20)^{19},$$

then k is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/3GAEI6tqLd](https://www.prepwisser.in/questions/3GAEI6tqLd)

Q59 JEE Main 2023 · 1 Feb · Shift 2

Let the sixth term in the binomial expansion of

$$\left(\sqrt{2^{\log_2(10-3^x)}} + \sqrt[5]{2^{(x-2)\log_2 3}} \right)^m$$

in the increasing powers of $2^{(x-2)\log_2 3}$, be 21. If the binomial coefficients of the second, third and fourth terms in the expansion are respectively the first, third and fifth terms of an A.P., then the sum of the squares of all possible values of x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/p5ETooKR35](https://www.prepwiser.in/questions/p5ETooKR35)

Q60 JEE Main 2023 · 31 Jan · Shift 1

The remainder on dividing 5^{99} by 11 is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/zjZfW2_y4g](https://www.prepwiser.in/questions/zjZfW2_y4g)

Q61 JEE Main 2023 · 30 Jan · Shift 2

50^{th} root of a number x is 12 and 50^{th} root of another number y is 18. Then the remainder obtained on dividing $(x + y)$ by 25 is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/d_GMWhPqNH](https://www.prepwiser.in/questions/d_GMWhPqNH)

Q62 JEE Main 2023 · 30 Jan · Shift 2

Let $x = (8\sqrt{3} + 13)^{13}$ and $y = (7\sqrt{2} + 9)^9$. If $[t]$ denotes the greatest integer $\leq t$, then :

(A) $[x]$ is odd but $[y]$ is even

(B) $[x]$ and $[y]$ are both odd

(C) $[x] + [y]$ is even

(D) $[x]$ is even but $[y]$ is odd

[Step-by-step solution ► prepwiser.in/questions/IFZyeWecem](https://www.prepwiser.in/questions/IFZyeWecem)

Q63 JEE Main 2023 · 29 Jan · Shift 1

Let the coefficients of three consecutive terms in the binomial expansion of $(1 + 2x)^n$ be in the ratio 2 : 5 : 8. Then the coefficient of the term, which is in the middle of those three terms, is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/4G93fZgD4o](https://www.prepwiser.in/questions/4G93fZgD4o)

Q64 JEE Main 2023 · 25 Jan · Shift 2

The remainder when $(2023)^{2023}$ is divided by 35 is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Fztps0Q3fM](https://www.prepwiser.in/questions/Fztps0Q3fM)

Q65 JEE Main 2022 · 29 Jun · Shift 2

Let $n \geq 5$ be an integer. If $9^n - 8n - 1 = 64\alpha$ and $6^n - 5n - 1 = 25\beta$, then $\alpha - \beta$ is equal to

- (A) $1 + {}^nC_2(8-5) + {}^nC_3(8^2-5^2) + \dots + {}^nC_n(8^{n-1}-5^{n-1})$
(B) $1 + {}^nC_3(8-5) + {}^nC_4(8^2-5^2) + \dots + {}^nC_n(8^{n-2}-5^{n-2})$
(C) ${}^nC_3(8-5) + {}^nC_4(8^2-5^2) + \dots + {}^nC_n(8^{n-2}-5^{n-2})$
(D) ${}^nC_4(8-5) + {}^nC_5(8^2-5^2) + \dots + {}^nC_n(8^{n-3}-5^{n-3})$

[Step-by-step solution ► prepwisar.in/questions/Z9SNvAHFbQ](https://www.prepwisar.in/questions/Z9SNvAHFbQ)

Q66 JEE Main 2022 · 24 Jun · Shift 1

The remainder when 3^{2022} is divided by 5 is :

- (A) 1 (B) 2
(C) 3 (D) 4

[Step-by-step solution ► prepwisar.in/questions/hQAqDTJlyu](https://www.prepwisar.in/questions/hQAqDTJlyu)

Q67 JEE Main 2021 · 27 Aug · Shift 2

$3 \times 7^{22} + 2 \times 10^{22} - 44$ when divided by 18 leaves the remainder _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/EkYUPTGO1R](https://www.prepwisar.in/questions/EkYUPTGO1R)

Q68 JEE Main 2021 · 25 Jul · Shift 1

If b is very small as compared to the value of a , so that the cube and other higher powers of $\frac{b}{a}$ can be neglected in the identity

$$\frac{1}{a-b} + \frac{1}{a-2b} + \frac{1}{a-3b} + \dots + \frac{1}{a-nb} = \alpha n + \beta n^2 + \gamma n^3$$

, then the value of γ is :

- (A) $\frac{a^2+b}{3a^3}$ (B) $\frac{a+b}{3a^2}$
(C) $\frac{b^2}{3a^3}$ (D) $\frac{a+b^2}{3a^3}$

[Step-by-step solution ► prepwisar.in/questions/r2opn7IECo](https://www.prepwisar.in/questions/r2opn7IECo)

Q69 JEE Main 2020 · 3 Sep · Shift 1

If the number of integral terms in the expansion of $(3^{1/2} + 5^{1/8})^n$ is exactly 33, then the least value of n is :

- (A) 264 (B) 256
(C) 128 (D) 248

[Step-by-step solution ► prepwisar.in/questions/C3Tatz8zln](https://www.prepwisar.in/questions/C3Tatz8zln)

Coefficient Problems · 27 PYQs

Q70 JEE Main 2025 · 3 Apr · Shift 2

Let $(1 + x + x^2)^{10} = a_0 + a_1x + a_2x^2 + \dots + a_{20}x^{20}$. If $(a_1 + a_3 + a_5 + \dots + a_{19}) - 11a_2 = 121k$, then k is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/J2bK_1LL7V](https://www.prepwiser.in/questions/J2bK_1LL7V)

Q71 JEE Main 2025 · 24 Jan · Shift 1

For some $n \neq 10$, let the coefficients of the 5th, 6th and 7th terms in the binomial expansion of $(1 + x)^{n+4}$ be in A.P. Then the largest coefficient in the expansion of $(1 + x)^{n+4}$ is:

- (A) 10 (B) 35
(C) 70 (D) 20

[Step-by-step solution ► prepwiser.in/questions/jFnMs5wvhn](https://www.prepwiser.in/questions/jFnMs5wvhn)

Q72 JEE Main 2025 · 23 Jan · Shift 2

If in the expansion of $(1 + x)^p(1 - x)^q$, the coefficients of x and x^2 are 1 and -2, respectively, then $p^2 + q^2$ is equal to :

- (A) 8 (B) 20
(C) 13 (D) 18

[Step-by-step solution ► prepwiser.in/questions/r_kAoRZzUx](https://www.prepwiser.in/questions/r_kAoRZzUx)

Q73 JEE Main 2024 · 9 Apr · Shift 2

The sum of the coefficient of $x^{2/3}$ and $x^{-2/5}$ in the binomial expansion of $(x^{2/3} + \frac{1}{2}x^{-2/5})^9$ is

- (A) 19/4 (B) 69/16
(C) 63/16 (D) 21/4

[Step-by-step solution ► prepwiser.in/questions/8LIX7XJ78r](https://www.prepwiser.in/questions/8LIX7XJ78r)

Q74 JEE Main 2024 · 4 Apr · Shift 2

If the coefficients of x^4 , x^5 and x^6 in the expansion of $(1 + x)^n$ are in the arithmetic progression, then the maximum value of n is:

- (A) 28 (B) 21
(C) 7 (D) 14

[Step-by-step solution ► prepwiser.in/questions/egXMS1NS8m](https://www.prepwiser.in/questions/egXMS1NS8m)

Q75 JEE Main 2024 · 1 Feb · Shift 1

If the Coefficient of x^{30} in the expansion of $(1 + \frac{1}{x})^6 (1 + x^2)^7 (1 - x^3)^8$; $x \neq 0$ is α , then $|\alpha|$ equals _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Hw7seH40oK](https://www.prepwiser.in/questions/Hw7seH40oK)

Q76 JEE Main 2024 · 27 Jan · Shift 2

The coefficient of x^{2012} in the expansion of $(1 - x)^{2008} (1 + x + x^2)^{2007}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/BR8I1WoWVg](https://www.prepwiser.in/questions/BR8I1WoWVg)

Q77 JEE Main 2023 · 15 Apr · Shift 1

Let $(a + bx + cx^2)^{10} = \sum_{i=0}^{20} p_i x^i$, $a, b, c \in \mathbb{N}$.

If $p_1 = 20$ and $p_2 = 210$, then $2(a + b + c)$ is equal to :

- (A) 15 (B) 8
(C) 6 (D) 12

[Step-by-step solution ► prepwisar.in/questions/2cBCIGbnWK](https://www.prepwisar.in/questions/2cBCIGbnWK)

Q78 JEE Main 2023 · 11 Apr · Shift 2

The sum of the coefficients of three consecutive terms in the binomial expansion of $(1 + x)^{n+2}$, which are in the ratio 1 : 3 : 5, is equal to :

- (A) 63 (B) 92
(C) 25 (D) 41

[Step-by-step solution ► prepwisar.in/questions/T2vVgxZon5](https://www.prepwisar.in/questions/T2vVgxZon5)

Q79 JEE Main 2023 · 10 Apr · Shift 1

If the coefficient of x^7 in $(ax - \frac{1}{bx^2})^{13}$ and the coefficient of x^{-5} in $(ax + \frac{1}{bx^2})^{13}$ are equal, then $a^4 b^4$ is equal to :

- (A) 22 (B) 33
(C) 44 (D) 11

[Step-by-step solution ► prepwisar.in/questions/RKigFz3tC0](https://www.prepwisar.in/questions/RKigFz3tC0)

Q80 JEE Main 2023 · 10 Apr · Shift 1

The coefficient of x^7 in $(1 - x + 2x^3)^{10}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/gfhjRt3BKS](https://www.prepwisar.in/questions/gfhjRt3BKS)

Q81 JEE Main 2023 · 8 Apr · Shift 2

The absolute difference of the coefficients of x^{10} and x^7 in the expansion of $(2x^2 + \frac{1}{2x})^{11}$ is equal to :

- (A) $11^3 - 11$ (B) $13^3 - 13$
(C) $12^3 - 12$ (D) $10^3 - 10$

[Step-by-step solution ► prepwisar.in/questions/u6jjj23jVF](https://www.prepwisar.in/questions/u6jjj23jVF)

Q82 JEE Main 2023 · 31 Jan · Shift 2

If the constant term in the binomial expansion of $\left(\frac{x^{\frac{5}{2}}}{2} - \frac{4}{x^l}\right)^9$ is -84 and the coefficient of x^{-3l} is $2^\alpha \beta$, where $\beta < 0$ is an odd number, then $|\alpha l - \beta|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/RuO2g9VBiT](https://www.prepwisar.in/questions/RuO2g9VBiT)

Q83 JEE Main 2023 · 29 Jan · Shift 2

Let K be the sum of the coefficients of the odd powers of x in the expansion of $(1+x)^{99}$. Let a be the middle term in the expansion of $\left(2 + \frac{1}{\sqrt{2}}\right)^{200}$. If $\frac{{}^{200}C_{99}K}{a} = \frac{2^l m}{n}$, where m and n are odd numbers, then the ordered pair (l, n) is equal to

(A) (50, 101)

(B) (50, 51)

(C) (51, 101)

(D) (51, 99)

[Step-by-step solution ► prepwisser.in/questions/nYY5dzo9nN](https://www.prepwisser.in/questions/nYY5dzo9nN)

Q84 JEE Main 2023 · 25 Jan · Shift 1

If a_r is the coefficient of x^{10-r} in the Binomial expansion of $(1+x)^{10}$, then

$$\sum_{r=1}^{10} r^3 \left(\frac{a_r}{a_{r-1}} \right)^2$$

is equal to

(A) 3025

(B) 4895

(C) 5445

(D) 1210

[Step-by-step solution ► prepwisser.in/questions/632063Qzi8](https://www.prepwisser.in/questions/632063Qzi8)

Q85 JEE Main 2022 · 26 Jul · Shift 1

If the coefficients of x and x^2 in the expansion of $(1+x)^p(1-x)^q$, $p, q \leq 15$, are -3 and -5 respectively, then the coefficient of x^3 is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/EnWoMQTpGQ](https://www.prepwisser.in/questions/EnWoMQTpGQ)

Q86 JEE Main 2022 · 25 Jun · Shift 2

The coefficient of x^{101} in the expression

$$(5+x)^{500} + x(5+x)^{499} + x^2(5+x)^{498} + \dots + x^{500}$$

, $x > 0$, is

(A) ${}^{501}C_{101} (5)^{399}$

(B) ${}^{501}C_{101} (5)^{400}$

(C) ${}^{501}C_{100} (5)^{400}$

(D) ${}^{500}C_{101} (5)^{399}$

[Step-by-step solution ► prepwisser.in/questions/qyd2OVCRDU](https://www.prepwisser.in/questions/qyd2OVCRDU)

Q87 JEE Main 2022 · 25 Jun · Shift 2

If the sum of the co-efficient of all the positive even powers of x in the binomial expansion of $\left(2x^3 + \frac{3}{x}\right)^{10}$ is $5^{10} - \beta \cdot 3^9$, then β is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/6CzuWvIyUZ](https://www.prepwisser.in/questions/6CzuWvIyUZ)

Q88 JEE Main 2022 · 25 Jun · Shift 1

Let C_r denote the binomial coefficient of x^r in the expansion of $(1+x)^{10}$. If for $\alpha, \beta \in \mathbb{R}$, $C_1 + 3.2C_2 + 5.3C_3 + \dots$ upto 10 terms

$$= \frac{\alpha \times 2^{11}}{2^\beta - 1} \left(C_0 + \frac{C_1}{2} + \frac{C_2}{3} + \dots \text{ upto 10 terms} \right)$$

then the value of $\alpha + \beta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/uM7Jvc7-7M](https://www.prepwisser.in/questions/uM7Jvc7-7M)

Q89 JEE Main 2021 · 20 Jul · Shift 2

For the natural numbers m, n , if $(1-y)^m(1+y)^n = 1 + a_1y + a_2y^2 + \dots + a_{m+n}y^{m+n}$ and $a_1 = a_2 = 10$, then the value of $(m+n)$ is equal to :

- (A) 88 (B) 64
(C) 100 (D) 80

[Step-by-step solution ► prepwisser.in/questions/flo9h6zUWh](https://www.prepwisser.in/questions/flo9h6zUWh)

Q90 JEE Main 2021 · 20 Jul · Shift 1

The coefficient of x^{256} in the expansion of

$(1-x)^{101}(x^2+x+1)^{100}$ is :

- (A) $^{100}C_{16}$ (B) $^{100}C_{15}$
(C) $-^{100}C_{16}$ (D) $-^{100}C_{15}$

[Step-by-step solution ► prepwisser.in/questions/p5dyDVkz7N](https://www.prepwisser.in/questions/p5dyDVkz7N)

Q91 JEE Main 2021 · 18 Mar · Shift 1

Let $(1+x+2x^2)^{20} = a_0 + a_1x + a_2x^2 + \dots + a_{40}x^{40}$. Then $a_1 + a_3 + a_5 + \dots + a_{37}$ is equal to

- (A) $2^{20}(2^{20} - 21)$
(B) $2^{19}(2^{20} - 21)$
(C) $2^{19}(2^{20} + 21)$
(D) $2^{20}(2^{20} + 21)$

[Step-by-step solution ► prepwisser.in/questions/A4iuT1Wpif](https://www.prepwisser.in/questions/A4iuT1Wpif)

Q92 JEE Main 2021 · 16 Mar · Shift 1

Let $[x]$ denote greatest integer less than or equal to x . If for $n \in \mathbb{N}$,

$$(1 - x + x^3)^n = \sum_{j=0}^{3n} a_j x^j,$$

then

$$\sum_{j=0}^{\left[\frac{3n}{2}\right]} a_{2j} + 4 \sum_{j=0}^{\left[\frac{3n-1}{2}\right]} a_{2j} + 1$$

is equal to :

- (A) $2^n - 1$
- (B) n
- (C) 2
- (D) 1

[Step-by-step solution ► prepwisser.in/questions/2M96jxg4Iq](https://www.prepwisser.in/questions/2M96jxg4Iq)

Q93 JEE Main 2020 · 5 Sep · Shift 2

The coefficient of x^4 in the expansion of $(1 + x + x^2 + x^3)^6$ in powers of x , is ____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/22FWfRjxqd](https://www.prepwisser.in/questions/22FWfRjxqd)

Q94 JEE Main 2020 · 4 Sep · Shift 2

If for some positive integer n , the coefficients of three consecutive terms in the binomial expansion of $(1 + x)^{n+5}$ are in the ratio $5 : 10 : 14$, then the largest coefficient in this expansion is :

- | | |
|---------|---------|
| (A) 330 | (B) 792 |
| (C) 252 | (D) 462 |

[Step-by-step solution ► prepwisser.in/questions/GTGAH6V9Ib](https://www.prepwisser.in/questions/GTGAH6V9Ib)

Q95 JEE Main 2020 · 9 Jan · Shift 1

The coefficient of x^4 is the expansion of $(1 + x + x^2)^{10}$ is ____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/NgaOml0pst](https://www.prepwisser.in/questions/NgaOml0pst)

Q96 JEE Main 2020 · 8 Jan · Shift 1

If a, b and c are the greatest value of ${}^{19}C_p$, ${}^{20}C_q$ and ${}^{21}C_r$ respectively, then :

- (A) $\frac{a}{11} = \frac{b}{22} = \frac{c}{21}$
(B) $\frac{a}{10} = \frac{b}{22} = \frac{c}{21}$
(C) $\frac{a}{10} = \frac{b}{11} = \frac{c}{42}$
(D) $\frac{a}{11} = \frac{b}{22} = \frac{c}{42}$

[Step-by-step solution](#) ► prepwiser.in/questions/PfRT4-a8bu

Binomial Coefficient Identities · 35 PYQs

Q97 JEE Main 2025 · 7 Apr · Shift 2

The sum of the series $2 \times 1 \times {}^{20}C_4 - 3 \times 2 \times {}^{20}C_5 + 4 \times 3 \times {}^{20}C_6 - 5 \times 4 \times {}^{20}C_7 + \dots + 18 \times 17 \times {}^{20}C_{20}$, is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► prepwiser.in/questions/R8k8mmdjgD

Q98 JEE Main 2025 · 4 Apr · Shift 2

If $1^2 \cdot ({}^{15}C_1) + 2^2 \cdot ({}^{15}C_2) + 3^2 \cdot ({}^{15}C_3) + \dots + 15^2 \cdot ({}^{15}C_{15}) = 2^m \cdot 3^n \cdot 5^k$, where $m, n, k \in \mathbb{N}$, then $m + n + k$ is equal to :

- (A) 20 (B) 19
(C) 18 (D) 21

[Step-by-step solution](#) ► prepwiser.in/questions/XKztwM39gC

Q99 JEE Main 2025 · 2 Apr · Shift 2

$$\text{If } \sum_{r=0}^{10} \left(\frac{10^{r+1} - 1}{10^r} \right) \cdot {}^{11}C_{r+1} = \frac{\alpha^{11} - 11^{11}}{10^{10}}, \text{ then } \alpha \text{ is equal to :}$$

- (A) 11 (B) 20
(C) 24 (D) 15

[Step-by-step solution](#) ► prepwiser.in/questions/MjimEyG-wK

Q100 JEE Main 2025 · 22 Jan · Shift 2

If $\sum_{r=1}^{30} \frac{r^2 ({}^{30}C_r)^2}{{}^{30}C_{r-1}} = \alpha \times 2^{29}$, then α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► prepwiser.in/questions/tt_cMV3LjF

Q101 JEE Main 2025 · 22 Jan · Shift 1

If $\sum_{r=0}^5 \frac{{}^{11}C_{2r+1}}{2^{r+2}} = \frac{m}{n}$, $\gcd(m, n) = 1$, then $m - n$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► prepwiser.in/questions/6EpAnLni1Y

Q102 JEE Main 2024 · 8 Apr · Shift 1

Let $\alpha = \sum_{r=0}^n (4r^2 + 2r + 1) {}^nC_r$ and $\beta = \left(\sum_{r=0}^n \frac{{}^nC_r}{r+1} \right) + \frac{1}{n+1}$. If $140 < \frac{2\alpha}{\beta} < 281$, then the value of n is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/KeBpgeaf-F](https://www.prepwiser.in/questions/KeBpgeaf-F)

Q103 JEE Main 2024 · 6 Apr · Shift 2

Let $0 \leq r \leq n$. If ${}^{n+1}C_{r+1} : {}^nC_r : {}^{n-1}C_{r-1} = 55 : 35 : 21$, then $2n + 5r$ is equal to :

- (A) 62 (B) 60
(C) 55 (D) 50

[Step-by-step solution ► prepwiser.in/questions/U_QeaIHYJ](https://www.prepwiser.in/questions/U_QeaIHYJ)

Q104 JEE Main 2024 · 4 Apr · Shift 1

Let

$$a = 1 + \frac{{}^2C_2}{3!} + \frac{{}^3C_2}{4!} + \frac{{}^4C_2}{5!} + \dots, b = 1 + \frac{{}^1C_0 + {}^1C_1}{1!} + \frac{{}^2C_0 + {}^2C_1 + {}^2C_2}{2!} + \frac{{}^3C_0 + {}^3C_1 + {}^3C_2 + {}^3C_3}{3!} + \dots$$

Then $\frac{2b}{a^2}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/t6emXrmd6a](https://www.prepwiser.in/questions/t6emXrmd6a)

Q105 JEE Main 2024 · 30 Jan · Shift 2

Let $\alpha = \sum_{k=0}^n \left(\frac{{}^nC_k}{k+1} \right)$ and $\beta = \sum_{k=0}^{n-1} \left(\frac{{}^nC_k {}^nC_{k+1}}{k+2} \right)$. If $5\alpha = 6\beta$, then n equals _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/cFgT9r_Qlr](https://www.prepwiser.in/questions/cFgT9r_Qlr)

Q106 JEE Main 2024 · 29 Jan · Shift 1

$$\text{If } \frac{{}^{11}C_1}{2} + \frac{{}^{11}C_2}{3} + \dots + \frac{{}^{11}C_9}{10} = \frac{n}{m} \text{ with } \gcd(n, m) = 1, \text{ then } n + m \text{ is equal to}$$

_____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/xCRzx7I9Vx](https://www.prepwiser.in/questions/xCRzx7I9Vx)

Q107 JEE Main 2024 · 27 Jan · Shift 1

${}^{n-1}C_r = (k^2 - 8) {}^nC_{r+1}$ if and only if :

- (A) $2\sqrt{2} < k < 2\sqrt{3}$
(B) $2\sqrt{2} < k \leq 3$
(C) $2\sqrt{3} < k < 3\sqrt{3}$
(D) $2\sqrt{3} < k \leq 3\sqrt{2}$

[Step-by-step solution ► prepwiser.in/questions/we31ZvnABI](https://www.prepwiser.in/questions/we31ZvnABI)

Q108 JEE Main 2023 · 1 Feb · Shift 1

The value of

$$\frac{1}{1!50!} + \frac{1}{3!48!} + \frac{1}{5!46!} + \dots + \frac{1}{49!2!} + \frac{1}{51!1!}$$

is :

(A) $\frac{2^{51}}{50!}$

(B) $\frac{2^{51}}{51!}$

(C) $\frac{2^{50}}{50!}$

(D) $\frac{2^{50}}{51!}$

[Step-by-step solution ► prepwiser.in/questions/0F7miAptt0](https://www.prepwiser.in/questions/0F7miAptt0)

Q109 JEE Main 2023 · 30 Jan · Shift 1

The coefficient of x^{301} in

$$(1+x)^{500} + x(1+x)^{499} + x^2(1+x)^{498} + \dots + x^{500}$$

is :

(A) $^{500}C_{300}$

(B) $^{501}C_{200}$

(C) $^{500}C_{301}$

(D) $^{501}C_{302}$

[Step-by-step solution ► prepwiser.in/questions/bpoaUiuCvs](https://www.prepwiser.in/questions/bpoaUiuCvs)

Q110 JEE Main 2023 · 25 Jan · Shift 2

$\sum_{k=0}^6 {}^{51-k}C_3$ is equal to :

(A) ${}^{51}C_4 - {}^{45}C_4$

(B) ${}^{51}C_3 - {}^{45}C_3$

(C) ${}^{52}C_3 - {}^{45}C_3$

(D) ${}^{52}C_4 - {}^{45}C_4$

[Step-by-step solution ► prepwiser.in/questions/riLjb0xZFE](https://www.prepwiser.in/questions/riLjb0xZFE)

Q111 JEE Main 2023 · 24 Jan · Shift 2

If

$$({}^{30}C_1)^2 + 2({}^{30}C_2)^2 + 3({}^{30}C_3)^2 + \dots + 30({}^{30}C_{30})^2 = \frac{\alpha 60!}{(30!)^2}$$

then α is equal to :

(A) 30

(B) 10

(C) 15

(D) 60

[Step-by-step solution ► prepwiser.in/questions/vTjZ-a5AUW](https://www.prepwiser.in/questions/vTjZ-a5AUW)

Q112 JEE Main 2023 · 24 Jan · Shift 1

The value of $\sum_{r=0}^{22} {}^{22}C_r {}^{23}C_r$ is

(A) ${}^{44}C_{23}$

(B) ${}^{45}C_{23}$

(C) ${}^{44}C_{22}$

(D) ${}^{45}C_{24}$

[Step-by-step solution ► prepwiser.in/questions/iOHamyxbqY](https://www.prepwiser.in/questions/iOHamyxbqY)

Q113 JEE Main 2023 · 24 Jan · Shift 1

Suppose

$$\sum_{r=0}^{2023} r^{2023} C_r = 2023 \times \alpha \times 2^{2022}$$

. Then the value of α is _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UV8r9YJcom](https://www.prepwiser.in/questions/UV8r9YJcom)

Q114 JEE Main 2022 · 29 Jul · Shift 2

$$\text{If } \sum_{k=1}^{10} K^2 (10C_k)^2 = 22000L, \text{ then } L \text{ is equal to}$$

_____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/op_Ar0W_Hc](https://www.prepwiser.in/questions/op_Ar0W_Hc)

Q115 JEE Main 2022 · 28 Jul · Shift 2

If

$$1 + (2 + {}^{49}C_1 + {}^{49}C_2 + \dots + {}^{49}C_{49})({}^{50}C_2 + {}^{50}C_4 + \dots + {}^{50}C_{50})$$

is equal to $2^n \cdot m$, where m is odd, then $n + m$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ykStMh2jIX](https://www.prepwiser.in/questions/ykStMh2jIX)

Q116 JEE Main 2022 · 26 Jul · Shift 2

$$\sum_{\substack{i,j=0 \\ i \neq j}}^n {}^nC_i {}^nC_j$$

is equal to

(A) $2^{2n} - {}^{2n}C_n$

(B) $2^{2n-1} - {}^{2n-1}C_{n-1}$

(C) $2^{2n} - \frac{1}{2} {}^{2n}C_n$

(D) $2^{2n-1} + {}^{2n-1}C_n$

[Step-by-step solution ► prepwiser.in/questions/TMxyewk88z](https://www.prepwiser.in/questions/TMxyewk88z)

Q117 JEE Main 2022 · 28 Jun · Shift 1

If

$$\sum_{k=1}^{31} \binom{31}{k} \binom{31}{k-1} - \sum_{k=1}^{30} \binom{30}{k} \binom{30}{k-1} = \frac{\alpha(60!)}{(30!)(31!)}$$

,

where $\alpha \in \mathbb{R}$, then the value of 16α is equal to

- (A) 1411 (B) 1320
(C) 1615 (D) 1855

[Step-by-step solution ► prepwiser.in/questions/e1HmTMAKUV](https://www.prepwiser.in/questions/e1HmTMAKUV)

Q118 JEE Main 2022 · 26 Jun · Shift 2

If

$$\binom{40}{0} + \binom{41}{1} + \binom{42}{2} + \dots + \binom{60}{20} = \frac{m}{n} {}^{60}C_{20}$$

m and n are coprime, then m + n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/VeBA-mGdu_](https://www.prepwiser.in/questions/VeBA-mGdu_)

Q119 JEE Main 2021 · 27 Aug · Shift 1

$\sum_{k=0}^{20} \binom{20}{k}^2$ is equal to :

- (A) ${}^{40}C_{21}$ (B) ${}^{40}C_{19}$
(C) ${}^{40}C_{20}$ (D) ${}^{41}C_{20}$

[Step-by-step solution ► prepwiser.in/questions/Q7_FsUTk4-](https://www.prepwiser.in/questions/Q7_FsUTk4-)

Q120 JEE Main 2021 · 26 Aug · Shift 1

If ${}^{20}C_r$ is the co-efficient of x^r in the expansion of $(1+x)^{20}$, then the value of $\sum_{r=0}^{20} r^2 \cdot {}^{20}C_r$ is equal to :

- (A) 420×2^{19} (B) 380×2^{19}
(C) 380×2^{18} (D) 420×2^{18}

[Step-by-step solution ► prepwiser.in/questions/NAMz92DdX5](https://www.prepwiser.in/questions/NAMz92DdX5)

Q121 JEE Main 2021 · 26 Aug · Shift 2

Let $\binom{n}{k}$ denotes nC_k and

$$\left[\begin{matrix} n \\ k \end{matrix} \right] = \begin{cases} \binom{n}{k}, & \text{if } 0 \leq k \leq n \\ 0, & \text{otherwise} \end{cases}$$

If

$$A_k = \sum_{i=0}^9 \binom{9}{i} \left[\begin{matrix} 12 \\ 12-k+i \end{matrix} \right] + \sum_{i=0}^8 \binom{8}{i} \left[\begin{matrix} 13 \\ 13-k+i \end{matrix} \right]$$

and $A_4 - A_3 = 190p$, then p is equal to :

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/ttieuxaby6](https://www.prepwisar.in/questions/ttieuxaby6)

Q122 JEE Main 2021 · 25 Jul · Shift 2

Let $n \in \mathbb{N}$ and $[x]$ denote the greatest integer less than or equal to x . If the sum of $(n+1)$ terms ${}^nC_0, 3 \cdot {}^nC_1, 5 \cdot {}^nC_2, 7 \cdot {}^nC_3, \dots$ is equal to $2^{100} \cdot 101$, then $2^{\left[\frac{n-1}{2}\right]}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/9mTrSTu5fy](https://www.prepwisar.in/questions/9mTrSTu5fy)

Q123 JEE Main 2021 · 18 Mar · Shift 2

Let nC_r denote the binomial coefficient of x^r in the expansion of $(1+x)^n$. If

$$\sum_{k=0}^{10} (2^2 + 3k)^{10} C_k = \alpha \cdot 3^{10} + \beta \cdot 2^{10}, \alpha, \beta \in \mathbb{R}$$

, then $\alpha + \beta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/98RjEVpkC_](https://www.prepwisar.in/questions/98RjEVpkC_)

Q124 JEE Main 2021 · 17 Mar · Shift 2

The value of $\sum_{r=0}^6 ({}^6C_r \cdot {}^6C_{6-r})$ is equal to :

(A) 924

(B) 1024

(C) 1124

(D) 1324

[Step-by-step solution ► prepwisar.in/questions/y_uVXXij_w](https://www.prepwisar.in/questions/y_uVXXij_w)

Q125 JEE Main 2021 · 26 Feb · Shift 1

Let $m, n \in \mathbb{N}$ and $\gcd(2, n) = 1$. If

$$30 \binom{30}{0} + 29 \binom{30}{1} + \dots + 2 \binom{30}{28} + 1 \binom{30}{29} = n \cdot 2^m$$

, then $n + m$ is equal to _____.

(Here $\binom{n}{k} = {}^nC_k$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/s9UfHvo5wx](https://www.prepwiser.in/questions/s9UfHvo5wx)

Q126 JEE Main 2021 · 24 Feb · Shift 2

If $n \geq 2$ is a positive integer, then the sum of the series

$${}^{n+1}C_2 + 2({}^2C_2 + {}^3C_2 + {}^4C_2 + \dots + {}^nC_2)$$

is :

(A) $\frac{n(2n+1)(3n+1)}{6}$

(B) $\frac{n(n+1)(2n+1)}{6}$

(C) $\frac{n(n+1)^2(n+2)}{12}$

(D) $\frac{n(n-1)(2n+1)}{6}$

[Step-by-step solution ► prepwiser.in/questions/wDE0fF7VBM](https://www.prepwiser.in/questions/wDE0fF7VBM)

Q127 JEE Main 2021 · 24 Feb · Shift 1

The value of

$$-{}^{15}C_1 + 2 \cdot {}^{15}C_2 - 3 \cdot {}^{15}C_3 + \dots - 15 \cdot {}^{15}C_{15} + {}^{14}C_1 + {}^{14}C_3 + {}^{14}C_5 + \dots + {}^{14}C_{11}$$
 is :

(A) $2^{13} - 13$

(B) $2^{16} - 1$

(C) 2^{14}

(D) $2^{13} - 14$

[Step-by-step solution ► prepwiser.in/questions/dRYOiz8Pot](https://www.prepwiser.in/questions/dRYOiz8Pot)

Q128 JEE Main 2021 · 24 Feb · Shift 2

For integers n and r , let

$$\binom{n}{r} = \begin{cases} {}^nC_r, & \text{if } n \geq r \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

The maximum value of k for which the sum

$$\sum_{i=0}^k \binom{10}{i} \binom{15}{k-i} + \sum_{i=0}^{k+1} \binom{12}{i} \binom{13}{k+1-i}$$

exists, is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Lp9DgyLUFS](https://www.prepwiser.in/questions/Lp9DgyLUFS)

Q129 JEE Main 2020 · 4 Sep · Shift 1

The value of $\sum_{r=0}^{20} {}^{50-r}C_6$ is equal to:

- (A) ${}^{50}C_6 - {}^{30}C_6$ (B) ${}^{51}C_7 - {}^{30}C_7$
(C) ${}^{50}C_7 - {}^{30}C_7$ (D) ${}^{51}C_7 + {}^{30}C_7$

Step-by-step solution ► [prepwisser.in/questions/cMXKrA6Q07](https://www.prepwisser.in/questions/cMXKrA6Q07)

Q130 JEE Main 2020 · 9 Jan · Shift 2

If $C_r \equiv {}^{25}C_r$ and

$C_0 + 5.C_1 + 9.C_2 + \dots + (101).C_{25} = 2^{25}.k$, then k is equal to ____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/juPzmI4UU3](https://www.prepwisser.in/questions/juPzmI4UU3)

Q131 JEE Main 2020 · 7 Jan · Shift 2

The number of ordered pairs (r, k) for which

$6.{}^{35}C_r = (k^2 - 3).{}^{36}C_{r+1}$, where k is an integer, is :

- (A) 6 (B) 3
(C) 2 (D) 4

Step-by-step solution ► [prepwisser.in/questions/kJlQMj6IU_](https://www.prepwisser.in/questions/kJlQMj6IU_)

General and Middle Term · 20 PYQs

Q132 JEE Main 2025 · 4 Apr · Shift 1

In the expansion of $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$, $n \in \mathbb{N}$, if the ratio of 15th term from the beginning to the 15th term from the end is $\frac{1}{6}$, then the value of nC_3 is

- (A) 4960 (B) 2300
(C) 1040 (D) 4060

Step-by-step solution ► [prepwisser.in/questions/Fv_gSgxjDY](https://www.prepwisser.in/questions/Fv_gSgxjDY)

Q133 JEE Main 2025 · 28 Jan · Shift 2

Let the coefficients of three consecutive terms T_r , T_{r+1} and T_{r+2} in the binomial expansion of $(a+b)^{12}$ be in a G.P. and let p be the number of all possible values of r . Let q be the sum of all rational terms in the binomial expansion of $(\sqrt[4]{3} + \sqrt[3]{4})^{12}$. Then $p+q$ is equal to:

- (A) 295
(B) 283
(C) 299
(D) 287

Step-by-step solution ► [prepwisser.in/questions/wvP11Sbh-j](https://www.prepwisser.in/questions/wvP11Sbh-j)

Q134 JEE Main 2025 · 24 Jan · Shift 2

Suppose A and B are the coefficients of 30^{th} and 12^{th} terms respectively in the binomial expansion of $(1+x)^{2n-1}$. If $2A = 5B$, then n is equal to:

- (A) 20 (B) 19
(C) 22 (D) 21

Step-by-step solution ► [prepwisser.in/questions/3TywyDlhZj](https://www.prepwisser.in/questions/3TywyDlhZj)

Q135 JEE Main 2024 · 4 Apr · Shift 1

The sum of all rational terms in the expansion of $\left(2^{\frac{1}{5}} + 5^{\frac{1}{3}}\right)^{15}$ is equal to :

- (A) 633 (B) 6131
(C) 3133 (D) 931

Step-by-step solution ► [prepwisser.in/questions/a7AEuhp4-G](https://www.prepwisser.in/questions/a7AEuhp4-G)

Q136 JEE Main 2024 · 1 Feb · Shift 2

Let m and n be the coefficients of seventh and thirteenth terms respectively

in the expansion of $\left(\frac{1}{3}x^{\frac{1}{3}} + \frac{1}{2x^{\frac{2}{3}}}\right)^{18}$. Then $\left(\frac{n}{m}\right)^{\frac{1}{3}}$ is :

- (A) $\frac{1}{9}$ (B) $\frac{1}{4}$
(C) $\frac{4}{9}$ (D) $\frac{9}{4}$

Step-by-step solution ► [prepwisser.in/questions/YddJv4mA6](https://www.prepwisser.in/questions/YddJv4mA6)

Q137 JEE Main 2023 · 11 Apr · Shift 2

If the 1011^{th} term from the end in the binominal expansion of $\left(\frac{4x}{5} - \frac{5}{2x}\right)^{2022}$ is 1024 times 1011^{th} term from the beginning, then $|x|$ is equal to

- (A) $\frac{5}{16}$ (B) 8
(C) 12 (D) 15

Step-by-step solution ► [prepwisser.in/questions/JcjIReaQMX](https://www.prepwisser.in/questions/JcjIReaQMX)

Q138 JEE Main 2023 · 11 Apr · Shift 1

The number of integral terms in the expansion of $\left(3^{\frac{1}{2}} + 5^{\frac{1}{4}}\right)^{680}$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/O9AC_vJkk7](https://www.prepwisser.in/questions/O9AC_vJkk7)

Q139 JEE Main 2023 · 6 Apr · Shift 1

If the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$, then the third term from the beginning is :

- (A) $30\sqrt{2}$ (B) $60\sqrt{3}$
(C) $60\sqrt{2}$ (D) $30\sqrt{3}$

Step-by-step solution ► [prepwisser.in/questions/eYrZ5o_Zuq](https://www.prepwisser.in/questions/eYrZ5o_Zuq)

Q140 JEE Main 2023 · 30 Jan · Shift 1

If the coefficient of x^{15} in the expansion of $(ax^3 + \frac{1}{bx^{1/3}})^{15}$ is equal to the coefficient of x^{-15} in the expansion of $(ax^{1/3} - \frac{1}{bx^3})^{15}$, where a and b are positive real numbers, then for each such ordered pair (a, b) :

- (A) $a = 3b$ (B) $ab = 1$
(C) $ab = 3$ (D) $a = b$

[Step-by-step solution ► prepwiser.in/questions/A8paHt5f0c](#)

Q141 JEE Main 2022 · 29 Jul · Shift 1

Let the ratio of the fifth term from the beginning to the fifth term from the end in the binomial expansion of $(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}})^n$, in the increasing powers of $\frac{1}{\sqrt[4]{3}}$ be $\sqrt[4]{6} : 1$. If the sixth term from the beginning is $\frac{\alpha}{\sqrt[4]{3}}$, then α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/2gY-nK0NqQ](#)

Q142 JEE Main 2022 · 25 Jul · Shift 1

If the maximum value of the term independent of t in the expansion of

$$\left(t^2 x^{\frac{1}{5}} + \frac{(1-x)^{\frac{1}{10}}}{t}\right)^{15}, x \geq 0$$

, is K , then $8K$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/o-50zzII0a](#)

Q143 JEE Main 2022 · 30 Jun · Shift 1

For two positive real numbers a and b such that $\frac{1}{a^2} + \frac{1}{b^3} = 4$, then minimum value of the constant term in the expansion of $(ax^{\frac{1}{8}} + bx^{-\frac{1}{12}})^{10}$ is :

- (A) $\frac{105}{2}$ (B) $\frac{105}{4}$
(C) $\frac{105}{8}$ (D) $\frac{105}{16}$

[Step-by-step solution ► prepwiser.in/questions/OqoLr3qkuT](#)

Q144 JEE Main 2022 · 28 Jun · Shift 2

The term independent of x in the expansion of

$$(1 - x^2 + 3x^3) \left(\frac{5}{2}x^3 - \frac{1}{5x^2}\right)^{11}, x \neq 0$$

is :

- (A) $\frac{7}{40}$ (B) $\frac{33}{200}$
(C) $\frac{39}{200}$ (D) $\frac{11}{50}$

[Step-by-step solution ► prepwiser.in/questions/u6C3W0ZUaO](#)

Q145 JEE Main 2021 · 27 Jul · Shift 2

A possible value of 'x', for which the ninth term in the expansion of

$$\left\{ 3^{\log_3 \sqrt{25^{x-1}+7}} + 3^{\left(-\frac{1}{8}\right)\log_3(5^{x-1}+1)} \right\}^{10}$$

in the increasing powers of $3^{\left(-\frac{1}{8}\right)\log_3(5^{x-1}+1)}$ is equal to 180, is :

- (A) 0 (B) -1
(C) 2 (D) 1

[Step-by-step solution ► prepwisar.in/questions/EiMTIJZkxZ](https://www.prepwisar.in/questions/EiMTIJZkxZ)

Q146 JEE Main 2021 · 25 Jul · Shift 1

The term independent of 'x' in the expansion of

$$\left(\frac{x+1}{x^{2/3} - x^{1/3} + 1} - \frac{x-1}{x - x^{1/2}} \right)^{10}$$

, where $x \neq 0, 1$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/duUt4ujqny](https://www.prepwisar.in/questions/duUt4ujqny)

Q147 JEE Main 2021 · 18 Mar · Shift 2

The term independent of x in the expansion of

$$\left[\frac{x+1}{x^{2/3} - x^{1/3} + 1} - \frac{x-1}{x - x^{1/2}} \right]^{10}$$

, $x \neq 1$, is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/5sI71-K3by](https://www.prepwisar.in/questions/5sI71-K3by)

Q148 JEE Main 2021 · 17 Mar · Shift 1

If the fourth term in the expansion of $(x + x^{\log_2 x})^7$ is 4480, then the value of x where $x \in \mathbb{N}$ is equal to :

- (A) 3 (B) 1
(C) 4 (D) 2

[Step-by-step solution ► prepwisar.in/questions/xamMOa4KHR](https://www.prepwisar.in/questions/xamMOa4KHR)

Q149 JEE Main 2021 · 16 Mar · Shift 1

If n is the number of irrational terms in the expansion of $(3^{1/4} + 5^{1/8})^{60}$, then (n - 1) is divisible by :

- (A) 30 (B) 8
(C) 7 (D) 26

[Step-by-step solution ► prepwisar.in/questions/Bgz4IBL1yD](https://www.prepwisar.in/questions/Bgz4IBL1yD)

Q150 JEE Main 2020 · 2 Sep · Shift 1

Let $\alpha > 0, \beta > 0$ be such that

$\alpha^3 + \beta^2 = 4$. If the maximum value of the term independent of x in the binomial expansion of $(\alpha x^{\frac{1}{9}} + \beta x^{-\frac{1}{6}})^{10}$ is $10k$,

then k is equal to :

(A) 176

(B) 336

(C) 352

(D) 84

[Step-by-step solution ► prepwisar.in/questions/31n2hxyyUk](https://www.prepwisar.in/questions/31n2hxyyUk)

Q151 JEE Main 2020 · 2 Sep · Shift 2

For a positive integer n ,

$(1 + \frac{1}{x})^n$ is expanded

in increasing powers of x . If three consecutive coefficients in this expansion are in the ratio,

$2 : 5 : 12$, then n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/mv_8MMAZwW](https://www.prepwisar.in/questions/mv_8MMAZwW)

Multinomial Theorem · 6 PYQs

Q152 JEE Main 2025 · 23 Jan · Shift 1

The sum of all rational terms in the expansion of $(1 + 2^{1/3} + 3^{1/2})^6$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/2nsHcyw6mH](https://www.prepwisar.in/questions/2nsHcyw6mH)

Q153 JEE Main 2024 · 27 Jan · Shift 2

Let $\alpha = \frac{(4!)!}{(4!)^{3!}}$ and $\beta = \frac{(5!)!}{(5!)^{4!}}$. Then :

(A) $\alpha \in \mathbb{N}$ and $\beta \in \mathbb{N}$

(B) $\alpha \in \mathbb{N}$ and $\beta \notin \mathbb{N}$

(C) $\alpha \notin \mathbb{N}$ and $\beta \in \mathbb{N}$

(D) $\alpha \notin \mathbb{N}$ and $\beta \notin \mathbb{N}$

[Step-by-step solution ► prepwisar.in/questions/CV-HBIUhfl](https://www.prepwisar.in/questions/CV-HBIUhfl)

Q154 JEE Main 2023 · 25 Jan · Shift 1

The constant term in the expansion of $(2x + \frac{1}{x^7} + 3x^2)^5$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/U-tQEC5v_Q](https://www.prepwisar.in/questions/U-tQEC5v_Q)

Q155 JEE Main 2022 · 29 Jun · Shift 1

If the constant term in the expansion of

$(3x^3 - 2x^2 + \frac{5}{x^5})^{10}$ is $2^k \cdot l$, where l is an odd integer, then the value of k is equal to:

- (A) 6 (B) 7
(C) 8 (D) 9

[Step-by-step solution ► prepwisser.in/questions/wHttU00vEM](https://www.prepwisser.in/questions/wHttU00vEM)

Q156 JEE Main 2021 · 31 Aug · Shift 2

If the coefficient of a^7b^8 in the expansion of $(a + 2b + 4ab)^{10}$ is $K \cdot 2^{16}$, then K is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/qUq40ufELB](https://www.prepwisser.in/questions/qUq40ufELB)

Q157 JEE Main 2020 · 4 Sep · Shift 1

Let $(2x^2 + 3x + 4)^{10} = \sum_{r=0}^{20} a_r x^r$

Then $\frac{a_7}{a_{13}}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/bsucKAhFKP](https://www.prepwisser.in/questions/bsucKAhFKP)

Numerically Greatest Term · 4 PYQs

Q158 JEE Main 2022 · 27 Jul · Shift 2

Let for the 9^{th} term in the binomial expansion of $(3 + 6x)^n$, in the increasing powers of $6x$, to be the greatest for $x = \frac{3}{2}$, the least value of n is n_0 . If k is the ratio of the coefficient of x^6 to the coefficient of x^3 , then $k + n_0$ is equal to :

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/B842-zNaUL](https://www.prepwisser.in/questions/B842-zNaUL)

Q159 JEE Main 2021 · 1 Sep · Shift 2

If the sum of the coefficients in the expansion of $(x + y)^n$ is 4096, then the greatest coefficient in the expansion is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/Q-BQXzBMCD](https://www.prepwisser.in/questions/Q-BQXzBMCD)

Q160 JEE Main 2021 · 25 Jul · Shift 2

If the greatest value of the term independent of 'x' in the

expansion of $(x \sin \alpha + a \frac{\cos \alpha}{x})^{10}$ is $\frac{10!}{(5!)^2}$, then the value of 'a' is equal to :

- (A) -1 (B) 1
(C) -2 (D) 2

[Step-by-step solution ► prepwisser.in/questions/ixz8y472M4](https://www.prepwisser.in/questions/ixz8y472M4)

Q161 JEE Main 2020 · 9 Jan · Shift 2

In the expansion of $\left(\frac{x}{\cos \theta} + \frac{1}{x \sin \theta}\right)^{16}$, if ℓ_1 is the least value of the term independent of x when $\frac{\pi}{8} \leq \theta \leq \frac{\pi}{4}$ and ℓ_2 is the least value of the term independent of x when $\frac{\pi}{16} \leq \theta \leq \frac{\pi}{8}$, then the ratio $\ell_2 : \ell_1$ is equal to :

(A) 8 : 1

(B) 16 : 1

(C) 1 : 8

(D) 1 : 16

Step-by-step solution ► [prepwisar.in/questions/YmCwZSGs0J](https://www.prepwisar.in/questions/YmCwZSGs0J)

Answer key — Binomial Theorem

Numbers match the question numbers above. For full working, open the solution link under each question.

1	B	2	D	3	B	4	C	5	806	6	C	7	25	8	118
9	D	10	7	11	C	12	2736	13	D	14	29	15	57	16	55
17	6	18	C	19	A	20	D	21	D	22	B	23	D	24	A
25	B	26	54	27	138	28	B	29	1275	30	A	31	5005	32	D
33	1	34	5040	35	2	36	1	37	405	38	5	39	2	40	5
41	55	42	C	43	D	44	8	45	21	46	4	47	13	48	C
49	57	50	1	51	B	52	D	53	B	54	A	55	36	56	A
57	31	58	400	59	4	60	9	61	23	62	C	63	1120	64	7
65	C	66	D	67	15	68	C	69	B	70	239	71	B	72	C
73	D	74	D	75	678	76	0	77	D	78	A	79	A	80	960
81	C	82	98	83	A	84	D	85	23	86	A	87	83	88	286
89	D	90	B	91	B	92	C	93	120	94	D	95	615	96	D
97	34	98	B	99	B	100	465	101	2035	102	5	103	D	104	8
105	10	106	2041	107	B	108	D	109	B	110	D	111	C	112	B
113	1012	114	221	115	99	116	A	117	A	118	102	119	C	120	D
121	49	122	98	123	19	124	A	125	45	126	B	127	D	128	12
129	B	130	51	131	D	132	B	133	B	134	D	135	C	136	D
137	A	138	171	139	B	140	B	141	84	142	6006	143	C	144	B
145	D	146	210	147	210	148	D	149	D	150	B	151	118	152	612
153	A	154	1080	155	D	156	315	157	8	158	24	159	924	160	D
161	B														

Want the next chapter?

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