MATHS

BOOKS - CENGAGE

BINOMIAL THEOREM

Worked Examples

1. Expand $(x+1)^4$.

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2. Expand $(x - 1/x)^5$.

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3. Find the eighth term in the expansion of $(2x + 3)^{10}$.

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4. Find the middle term in the expansion of $(x + 2)^{12}$.

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5. Find the coefficient of x^4 in the expansion of $\left(x^4 + 1/x^3\right)^{15}$.

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Test Yourself Level 1

1. Write down the expansion of $(a + b)^6$.

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2. Write down the expansion of $(1+x)^5$.

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3. Write down the first three terms in the expansion of $(a+1/a)^8$.

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4. Write down the last two terms in the expansion of $(2x - 1/x)^{10}$.

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5. Write down the sum of the first three terms in the expansion of $(1 + 0.02)^{12}$.

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Test Yourself Level 2

1. Evaluate $(1.03)^7$ correct to five decimal places using binomial theorem.

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2. Evaluate $(0.99)^5$ correct to five decimal places using binomial theorem.

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3. Find the seventh term in the expansion of $(x + 2/x)^{10}$.

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4. Find the tenth term in the expansion of $(2x + 3/x)^{20}$.

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5. Find the middle term in the expansion of $(x + 1/x)^9$.

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6. Find the middle terms in the expansion of $\left(2x^2/3 - 3/2x\right)^{11}$.

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Test Yourself Level 3

1. Find the value of $\left(2+\sqrt{3}\right)^{5}+\left(2-\sqrt{3}\right)^{5}$.

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2. Find the value of $\left(\sqrt{2}+1\right)^{6}+\left(\sqrt{2}-1\right)^{6}$.

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3. Find the middle term/terms in the expansion of $\left(\sqrt{x}-3/x^{2}\right)^{13}$.

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4. Find the middle term/terms in the expansion of $\left(4x^2/3 - 3/2x\right)^9$.

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5. Find the coefficient of x^7 in the expansion of $\left(x^2 + 1/x\right)^{11}$.

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6. Which term in the expansion of $\left(2x^2 + 1/3x^3\right)^{10}$ does not contain x?

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7. What is the coefficient of x^{-9} in the expansion of $\left(x^2/2 + 2/x\right)^9$?

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8. What is the coefficient of x^{-11} in the expansion of $\left(\sqrt{x} - 2/x\right)^{17}$?

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9. If the first three terms in the expansion of $(1 + ax)^n$ are $1, 6x,$ and $16x^2$, what are the values of a and n?

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Test Yourself Multiple Choice Questions

1. The number of terms in the expansion of $(2x + 3y)^{17}$ is

A. 16

B. 17

C. 18

D. 34

Answer: C

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2. The number of terms in the expansion of $\left(\sqrt{x}+\sqrt{y}\right)^{8}+\left(\sqrt{x}-\sqrt{y}\right)^{8}$ is

A. 8

B. 7

C. 5

D. 9

Answer: C

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3. The number of terms in the expansion of $\{5x+2y\}^7 - \left\{(5x-2y)^7\right\}$ is

A. 4

B. 8

C. 6

D. 3

Answer: A

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4. The number of terms in the expansion of $\left\{(\sqrt{2}x+\sqrt{3}y)^{10}-(\sqrt{2}x-\sqrt{3}y)^{10}\right\}$ is

A. 11

B. 9

C. 6

D. 5

Answer: D

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5. The number of terms in the expansion of $\left\{(x+a)^{16}+(x-a)^{16}\right\}$ is

A. 7

B. 8

C. 9

D. 17

Answer: C

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6. The 10^{th} term in the expansion of $\left(2x^2 + \frac{1}{x^2}\right)^{12}$ is

A. $264x^{-16}$

B. $220x^{-12}$

C. $792x^{-14}$

D. $1760x^{-12}$

Answer: D

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7. The 4^{th} term in the expansion of $(x-2y)^{12}$ is

A. $1760x^8y^6$

B. $-440x^7y^5$

C. $-1760x^9y^3$

D. None of these

Answer: C

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8. The 13^{th} term in the expansion of $\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}, x \neq 0$ is

A. 16854

B. 18564

C. 17954

D. 18832

Answer: B

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9. The 3^{rd} term from the end in the expansion of $\left(x+\frac{1}{x}\right)^6$ is

A. $\frac{15}{x^2}$

B. $\frac{30}{x^3}$

C. $\frac{12}{x^2}$

D. $\frac{24}{x^3}$

Answer: A

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10. The 4^{th} term from the end in the expansion of $\left(\sqrt{x}-\sqrt{y}\right)^{17}$ is

A. ${}^{17}C_6\left(\sqrt{x}\right)^{11}y^3$

B. $-{}^{17}C_5x^6\left(\sqrt{y}\right)^5$

C. ${}^{17}C_4x^{13/2}y^2$

D. $-{}^{17}C_{13}x^2y^{13/2}$

Answer: C

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11. The middle term in the expansion of $\left(x - \frac{1}{2y}\right)^{10}$ is

A. $\frac{-63}{8}x^5y^{-5}$

B. $\frac{-21}{4}x^6y^{-6}$

C. $\frac{63}{8}x^4y^{-4}$

D. $\frac{-63}{8}x^4y^{-4}$

Answer: A

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12. The middle term in the expansion of $\left(x^2 - \frac{2}{x}\right)^{10}$ is

A. $8064x^5$

B. $-8064x^5$

C. $6720x^4$

D. $-6720x^4$

Answer: B

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13. The coefficient of x^2 in the expansion of $\left(3x - \frac{1}{x}\right)^6$ is

A. 405

B. 1215

C. 2430

D. 3645

Answer: B

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14. The coefficient of x^6 in the expansion of $\left(3x^2 - \frac{1}{3x}\right)^9$ is

A. 576

B. 756

C. 189

D. 378

Answer: D

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15. The term independent of x in the expansion of $\left(\sqrt{x}+\frac{1}{3x^2}\right)^{10}$ is

A. 135

B. 132

C. 15

D. 5

Answer: D

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16. The term independent of x in the expansion of $\left(x - \frac{1}{x}\right)^{12}$ is

A. 924

B. 462

C. 231

D. 693

Answer: A

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17. The coefficient of x^{32} in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$ is

A. 273

B. 546

C. 1365

D. 1032

Answer: C

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18. The term independent of x in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$ is

A. $\frac{1}{24}$

B. $\frac{7}{18}$

C. $\frac{8}{24}$

D. $\frac{5}{36}$

Answer: B

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19. Which term contains x^3 in the expansion of $\left(3x - \frac{1}{2x}\right)^8$?

A. 2^{nd}

B. 3^{rd}

C. 5^{th}

D. None of these

Answer: D

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20. The coefficient of x^{-4} in the expansion of $\left(\frac{4x}{5}+\frac{5}{2x}\right)^{8}$ is

A. 625

B. 1875

C. 4375

D. None

Answer: C

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21. The total number of terms in the expansion of $(x+k)^{100}+(x-k)^{100}$ after simplification is

A. 50

B. 51

C. 101

D. 202

Answer: B

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22. If the coefficients of the second, third and fourth terms in the expansion of $(1+x)^n$ are in A.P., then $n =$

A. 5

B. 6

C. 7

D. 9

Answer: C

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23. If p and q are positive integers, then the coefficients of x^p and x^q in the expansion of $(1+x)^{p+q}$ are

A. equal

B. equal with opposite signs

C. reciprocal to each other

D. none of these

Answer: A

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24. Let the coefficient of x^n in the expansion of $(1+x)^{2n}$ be P and the coefficient of x^n in the expansion of $(1+x)^{2n-1}$ be q, then

A. $P = 2q$

B. $2P = q$

C. $2P = 3q$

D. $3P = 2q$

Answer: A

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25. In the expansion of $(1+x)^n$, the binomial coefficient of three consecutive terms are respectively 220, 495 and 792. The value of n is

A. 10

B. 11

C. 12

D. 13

Answer: C

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26. If the coefficients of x^7 and x^8 are equal in the expansion of $\left(2+\frac{x}{3}\right)^n$, then $n=$

A. 15

B. 45

C. 55

D. 56

Answer: C

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Test Yourself Multiple Choice Questions Olympiad And Ntse Level Exercises

1. If rth and $(r+1)$th terms in the expansion of $(p+q)^n$ are equal, then $\frac{(n+1)q}{r(p+q)}$ is

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. 1

D. 0

Answer: C

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2. If the coefficients of T_r, T_{r+1} and T_{r+2} terms of $(1+x)^{14}$ are in A.P., then $r =$

A. 6

B. 7

C. 8

D. 9

Answer: D

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3. The ratio of the coefficient of x^{15} to the term independent of x in the expansion of $\left(x^2+\frac{2}{x}\right)^{15}$ is

A. $1:32$

B. $1:16$

C. $1:12$

D. $1:8$

Answer: A

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4. The approximate value of $(1.0002)^{3000}$ is

A. 1.6

B. 1.4

C. 1.8

D. 1.2

Answer: A

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5. $10^n + 3\left(4^{n+2}\right) + 5$ is divisible by $(n \in N)$

A. 7

B. 5

C. 9

D. 17

Answer: C

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6. If n is an odd natural number, then number of zeros at the end of $99^n + 1$ is

A. $2n$

B. n

C. 2

D. None of these

Answer: C

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7. If the three consecutive coefficients in the expansion of $(1+x)^n$ are 28, 56 and 70, then the value of n is

A. 6

B. 4

C. 8

D. 10

Answer: C

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8. The number of integral terms in the expansion of $\left(5^{1/2}+7^{1/6}\right)^{642}$ is

A. 106

B. 108

C. 103

D. 109

Answer: B

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9. Match the given columns:

	Column I	Column II	
(a)	If ${}^{(n+1)}C_4 + {}^{(n+1)}C_3 + {}^{(n+2)}C_3 > {}^{(n+3)}C_3$, then possible value(s) of n is/are	(p)	4
(b)	The remainder when $(3053)^{456} - (2417)^{353}$ is divided by 9 is less than	(q)	5
(c)	The digit in the units place of the number $183! + 3^{183}$ is greater than	(r)	6
(d)	If the sum of the coefficients of the first, second and third terms in the expansion of $\left(x^2 + \frac{1}{x}\right)^m$ is 46, then the index of the term that does not contain x is greater than	(s)	7

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10. Match the given columns:

	Column I		Column II
(a)	If the coefficients of two consecutive terms in the expansion of $(1+x)^n$ are equal, then n can be	(p)	9
(b)	If $15^n + 23^n$ is divisible by 19, then n can be	(q)	10
(c)	If ${}^{10}C_0\,{}^{20}C_{10} - {}^{10}C_1\,{}^{18}C_{10} + {}^{10}C_2\,{}^{16}C_{10} - \ldots$ is divisible by 2^n, then n can be	(r)	11
(d)	If the coefficients of T_r, T_{r+1} and T_{r+2} terms of $(1+x)^{14}$ are in A.P., then the sum of possible values of r is more than	(s)	12

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