# MATHS

# BOOKS - RD SHARMA MATHS (HINGLISH)

# BINOMIAL THEOREM

Solved Examples And Exercises

**1.** Find the 9th term in the expansion of $\left(\dfrac{x}{a} - \dfrac{3a}{x^2}\right)^{12}$.

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**2.** Find the 4th term from the end in the expansion of $\left( \dfrac{3}{x^2} - \dfrac{x^3}{6} \right)^7$.

**3.** Using binomial theorem, indicate which is larger $(1.1)^{10000}$ or $1000$?

**4.** Show that $2^{4n+4} - 15n - 16$, where $n \in N$ is divisible by 225.

**5.** Show that the middle term in the expansion $(1 + x)^{2n}$ is $\dfrac{1.\ 3.\ 5(2n - 1)}{n!}(2)^n x^n$.

**6.** Find the coefficients of $x^{32}$ in the expansion of $\left(x^4 - \dfrac{1}{x^3}\right)^{15}$.

**7.** Find the middle term in the expansion $\left(\dfrac{2}{3}x^2 - \dfrac{3}{2x}\right)^{20}$ .

**8.** Find the middle terms in the expansion $\left(3x - \dfrac{x^3}{6}\right)^{7}$ .

**9.** Find the coefficient of $x^4$ in the expansion of $\left(1 + x + x^2 + x^3\right)^6$.

**10.** The term independent of x in expansion of $\left(\dfrac{x+1}{x^{\frac{2}{3}} - x^{\frac{1}{3}} + 1} - \dfrac{x-1}{x - x^{\frac{1}{2}}}\right)$ is (1) 120 (2) 210 (3) 310 (4) 4

**11.** Prove that there is no term involving $x^6$ in the expansion of $\left(2x^2 - \dfrac{3}{x}\right)^{11}$ , where $\neq 0$.

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**12.** Find the term independent of $x$ in the expansion of $\left(3x^2 - \dfrac{1}{2x^3}\right)^{10}$ .

A. 5th term

B. 6th Term

C. 7th term

D. 4th term

**Answer: A**

**13.** Find the coefficient of $x^{50}$ after simplifying and collecting the like terms in the expansion of $(1+x)^{1000} + x(1+x)^{999} + x^2(1+x)^{998} + + x^{1000}$.

**14.** Find the coefficient of $x^n$ in the expansion of $(1+x)(1-x)^n$.

**15.** If $a_1, a_2, a_3, a_4$ be the coefficient of four consecutive terms in the expansion of $(1+x)^n$, then prove that: $\dfrac{a_1}{a_1 + a_2} + \dfrac{a_3}{a_3 + a_4} = \dfrac{2a_2}{a_2 + a_3}$.

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**16.** Find the number of integral terms in the expansion of $\left(5^{\frac{1}{2}} + 7^{\frac{1}{8}}\right)^{1024}$.

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**17.** Find the coefficients of $x^7$ in $\left(ax^2 + \dfrac{1}{bx}\right)^{11}$ a n

d $x^{-7} \in \left(a\dfrac{x^{-1}}{bx^2}\right)^{11}$ and find the relation between

$a\,and\,b$ so that coefficients are equal.

**18.** Find the coefficient of $x^5$ in the expansion of

$(1+x)^{21} + (1+x)^{22} + \, + (1+x)^{30}.$

**19.** If the middle term in the binomial expansion of $\left(\dfrac{1}{x} + x\sin x^{10}\right)$ is equal to $\dfrac{63}{8}$, find the value of $x$.

**20.** Find the greatest value of the term independent of $x$ in the expansion of $\left(x\sin\alpha + \dfrac{\cos\alpha}{x}\right)^{10}$, where $\alpha \in R$.

**21.** If A be the sum of odd terms and B that of even terms in the expansion of $(x + a)^n$ prove that: $A^2 - B^2 = (x^2 - a^2)^n$

**22.** Using binomial theorem, expand $\left\{(x + y)^5 + (x - y)^5\right\}$. and hence find the value of $\left\{(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5\right\}$.

**23.** Using binomial theorem, prove that $2^{3n} - 7^n - 1$ is divisible by $49$, where $n \in N.$

**24.** Using binomial theorem, prove that $(101)^{50} > 100^{50} + 99^{50}.$

**25.** Expand $\left(x^2 + 2a\right)^5$ by binomial theorem.

**26.** Prove that $\sum\limits_{r=0}^{n} {}^{\wedge} nC_r 3^r = 4^n$

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**27.** By using binomial theorem, expand: $\left(1 + x + x^2\right)^3$ (b) $\left(1 - x + x^2\right)^4$

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**28.** If the third term in the expansion of $\left(\dfrac{1}{x} + x^{\log_{10} x}\right)^5$ is 1000, then find $x$

**29.** In the binomial expansion of $(1 + x)^n$ , coefficients of the fifth, sixth and seventh terms are in A.P. find all the values of $n$ for which this can happen.

**30.** In the binomial expansion of $(a + b)^n$ , coefficients of the fourth and thirteenth terms are equal to each other. Find $n$ .

**31.** Find the value of $a$ so that the term independent of $x$ in $\left( \sqrt{x} - \dfrac{k}{x^2} \right)^{10}$ is $405$ .

**32.** It $n$ is a positive integer, prove that $3^{3n} - 26n - 1$ is divisible by $676$.

**33.** Using binomial theorem, prove that $3^{2n+2} - 8^n - 9$ is divisible by $64$, where $n \in N$.

**34.** For what value of x is the ninth term in the expansion of $\left( 3^{\log_3 \sqrt{25^{x-1}+7}} + 3^{-\frac{1}{8}\log_3 \left(5^{x-1}+1\right)} \right)^{10}$ is equal to $180$

**35.** If the fourth term in the expansion of

$$\left\{\sqrt{\frac{1}{x^{\log^{x+1}}} + \frac{1}{x12}}\right.$$

is equal to

$200 and x > 1,$ then find $x.$

**36.** If the coefficient of 2nd, 3rd and 4th terms in the expansion of $(1 + x)^{2n}$ are in A.P. , show that

$2n^2 - 9n + 7 = 0.$

**37.** If the coefficient of $(2r + 4)th$ and $(r - 2)th$ terms in the expansion of $(1 + x)^{18}$ are equal, find $r$ .

A. 4

B. 5

C. 6

D. 7

**Answer:**

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**38.** Find the value of $\alpha$ for which the coefficients of the middle terms in the expansions of $(1 + \alpha x)^4 and (1 + \alpha x)^6$ are equal, find $\alpha$.

**39.** If the term free form x in the expansion of $\left( \sqrt{x} - \dfrac{m}{x^2} \right)^{10}$ is 405, find the value of m.

**40.** If the seventh term from the beginning and end in the binomial expansion of $\left( 23 + \dfrac{1}{33} \right)^n$,

are equal, find $n$.

**41.** Find $n$ in the binomial $\left(23 + \dfrac{1}{33}\right)^n$ , if the ration 7th term from the beginning to the 7 term from the end $\dfrac{1}{6}$.

**42.** Write the number of the coefficients in the expansion of $\left(1 - 3x + 3x^2 - x^3\right)^8$.

**43.** Write the sum of the coefficients in the expansion of $\left(1 - 3x + x^2\right)^{111}$.

**44.** Find the number of terms in the expansion of $(a + b + c)^n$.

**45.** Write last two digits of the number $3^{400}$.

**46.** Find the 8th term in the expansion of $\left(x^{\frac{3}{2}}y^{\frac{1}{2}} - x^{\frac{1}{2}}y^{\frac{3}{2}}\right)^{10}$.

**47.** If $n$ is a positive integer, find the coefficient of $x^{-1}$ in the expansion of $(1+x)^n\left(1 + \dfrac{1}{x}\right)^n$.

**48.** Find the sixth term in the expansion $\left(y^{\frac{1}{2}} + x^{\frac{1}{3}}\right)^n$ , if the binomial coefficient of the third term of the end is $45$.

**49.** Which term in the expansion of $\left\{\left(\dfrac{x}{\sqrt{y}}\right)^{\frac{1}{3}} + \left(\dfrac{y}{(x)^{\frac{1}{3}}}\right)^{\frac{1}{2}}\right\}^{21}$ contains x and y to one and the same power ?

**50.** Find the number of terms in the expansions of the following: $(2x - 3y)^9$

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**51.** Find the number of terms in the expansions of the following: $\left(1 + 3\sqrt{2}x\right)^9 + \left(1 - 3\sqrt{2}x\right)^9$

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**52.** Find the number of terms in the expansions of the following: $\left(\sqrt{x} + \sqrt{y}\right)^{10}$

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**53.** Find the number of terms in the expansions of

the following: $(3x + y)^8$

**54.** Find the number of terms in the expansions of

the following: $(2x + 3y - 4z)^n$

**55.** Find the number of terms in the expansions of the following: $\left(1 + 2x + x^2\right)^{20}$

**56.** Expand $\left(2x - 3y\right)^4$ by binomial theorem.

**57.** Using binomial theorem expand $\left(1 + \dfrac{x}{2} - \dfrac{2}{x}\right)^4$, $x \neq 0$.

**58.** Find the expansion of $\left(3x^2 - 2ax + 3a^2\right)^3$ using binomial theorem.

**59.** Using binomial theorem, expand $\left(x - \dfrac{1}{x}\right)^6$.

**60.** Find an approximation of $(0.99)^5$ using the first three terms of its expansion.

**61.** Using binomial theorem compute : $(99)^5$

**62.** Using binomial theorem compute : $(102)^6$

**63.** Using binomial theorem compute : $(10.1)^5$

**64.** Write down the binomial expansion of $(1+x)^{n+1}$ , when x=8. Deduce that $9^{n+1} - 8n - 9$ is divisible by 64 where, $n$ is a positive integer.

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**65.** Using binomial theorem, prove that $6^n - 5n$ always leaves he remainder 1 when divided by 25.

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**66.** Which is larger $(10.1)^{100000}$ or $10,000$?

**67.** If $a \, and \, b$ are distinct integers, prove that $a^n - b^n$ is divisible by $(a - b)$ where $n \in \mathbb{N}$.

**68.** Using binomial theorem, write down the expansion of $(2x + 3y)^5$

**69.** Using binomial theorem, write down the expansions of the following: $(1 - 3x)^7$

**70.** Using binomial theorem, write down the expansions of the following: $\left(\sqrt[3]{x} - \sqrt[3]{a}\right)^6$

**71.** Using binomial theorem, write down the expansions of the following: $\left(1 - 2x + 3x^2\right)^3$

**72.** Using binomial theorem, write down the expansions of the following: $(2x - 3y)^4$

**73.** Using binomial theorem, write down the expansions of the following: $\left(ax - \dfrac{b}{x}\right)^6$

**74.** Using binomial theorem, write down the expansions of the following: $\left(1 + 2x - 3x^2\right)^5$

**75.** Using binomial theorem, write down the expansions of the following: $\left(x - \dfrac{1}{x}\right)^6$

**76.** Using binomial theorem, write down the expansions of the following: $\left(\sqrt{\dfrac{x}{a}} - \sqrt{\dfrac{a}{x}}\right)^6$

**77.** Using binomial theorem, write down the expansions of the following: $\left(x + 1 - \dfrac{1}{x}\right)^3$

**78.** Evaluate the following: $\left(\sqrt{x+1} + \sqrt{x-1}\right)^6 + \left(\sqrt{x+1} - \sqrt{x-1}\right)^6$

**79.** Evaluate the following:

$$\left(3 + \sqrt{2}\right)^5 - \left(3 - \sqrt{2}\right)^5$$

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**80.** Evaluate the following:

$$\left(1 + 2\sqrt{x}\right)^5 + \left(1 - 2\sqrt{x}\right)^5$$

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**81.** Evaluate the following:

$$\left(\sqrt{3} + 1\right)^5 - \left(\sqrt{3} - 1\right)^5$$

**82.** Evaluate the following:

$$\left(\sqrt{3} + \sqrt{2}\right)^6 - \left(\sqrt{3} - \sqrt{2}\right)^6$$

**83.** Evaluate the following:

$$\left\{a^2 + \sqrt{a^2 - 1}\right\}^4 + \left\{a^2 - \sqrt{a^2 - 1}\right\}^4$$

**84.** Evaluate the following:

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

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**85.** Evaluate the following:

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

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**86.** Evaluate the following:

$$\left(2 + \sqrt{3}\right)^7 + \left(2 - \sqrt{3}\right)^7$$

**87.** Evaluate the following: $(0.99)^5 + (1.01)^5$

**88.** Find $(a+b)^4 - (a-b)^4.$ Hence evaluate $\left(\sqrt{3}+\sqrt{2}\right)^4 - \left(\sqrt{3}-\sqrt{2}\right)^4$

**89.** Find $(x + 1)^6 + (x - 1)^6$. Hence evaluate $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$.

**90.** Using binomial theorem evaluate each of the following: $(96)^3$

**91.** Using binomial theorem evaluate each of the following: $(102)^5$

**92.** Using binomial theorem evaluate each of the following: $(101)^4$

**93.** Using binomial theorem evaluate each of the following: $(98)^5$

**94.** Using binomial theorem indicate which is larger $(1.1)^{10000}$ or $1000$?

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**95.** Write the general term in the expansion of $\left(x^2 - y\right)^6$.

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**96.** Find the 10th term in the binomial expansion of $\left(2x^2 + \dfrac{1}{x}\right)^{12}$.

**97.** Find the constant term in the expansion of $\left( \dfrac{4x^2}{3} + \dfrac{3}{2x} \right)^9$.

**98.** Find 13th term in the expansion of $\left( 9x - \dfrac{1}{3\sqrt{x}} \right)^{18}$, $x \neq 0$.

**99.** Find the 11th term from the end in the expansion of $\left(2x - \dfrac{1}{x^2}\right)^{25}$.

**100.** Find $n$, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2} + \dfrac{1}{\sqrt[4]{3}}\right)^{n}$ is $\sqrt{6}:1$.

**101.** Find a if 17th and 18th terms in the expansion of $(2 + a)^{50}$ are equal.

**102.** Show that the middle term in the expansion of $(1 + x)^{2n}$ is $= \dfrac{1.3 \cdot 5...(2n - 1)}{n!} 2^n x^n$

**103.** Prove that the coefficient of the middle term in the expansion of $(1 + x)^{2n}$ is equal to the sum

of the coefficients of middle terms in the expansion of $(1 + x)^{2n-1}$

**104.** Find the coefficient of $x^{10}$ in the binomial expansion of $\left(2x^2 - \dfrac{1}{x}\right)^{20}$, $when\ x \neq 0$.

**105.** Find the coefficient of $x^6 y^3$ in the expansion of $(x + 2y)^9$.

**106.** Find the coefficient of $x^{40}$ in the expansion of $\left(1 + 2x + x^2\right)^{27}$.

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**107.** Find the coefficient of $x^5$ in the expansioin of the product $(1 + 2x)^6 (1 - x)^7$.

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**108.** Find the term independent of $x$ in the expansion of: $\left(x - \dfrac{1}{x}\right)^{14}$.

**109.** Find the term independent of $x$ in the expansion of: $\left(2x^2 - \dfrac{3}{x^3}\right)^{10}$.

**110.** In the binomial expansion of $(1 + a)^{m+n}$, prove that the coefficient of $a^m$ and $a^n$ are equal.

**111.** Prove that the coefficients of $x^n$ in $(1 + x)^{2n}$ is twice the coefficient of $x^n$ in $(1 + x)^{2n-1}$.

**112.** Find a positive value of $m$ for which the coefficient of $x^2$ in the expansion f $(1 + x)^m$ is 6.

**113.** If the coefficients of $(r - 5)^{th}$ and $(2r - 1)^{th}$ terms in the expansion of $(1 + x)^{34}$ are equal, find $r$.

**114.** The coefficients of three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio 1:7:42. Find $n$.

**115.** If the coefficients of $a^{r-1}$, $a^r$ and $a^{r+1}$ in the binomial expansion of $(1+a)^n$ are in A.P., prove that $n^2 - n(4r+1) + 4r^2 - 2 = 0$.

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**116.** The coefficients of $(r-1)^{th}$, $rth$ $and$ $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1:3:5. Find $n$ $and$ $r$.

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**117.** If the fourth term in the expansion of $\left(ax + \dfrac{1}{x}\right)^n$ $is$ $\dfrac{5}{2}$, then find the values of $a$ $and$ $n.$

**118.** The sum of the coefficients of first three term in the expansion of $\left(x - \dfrac{3}{x^2}\right)^m$, $x \neq 0$. m being a natural number, is 559. Find the term of the expansion containing $x^3$.

**119.** If $x^p$ occurs in the expansion of $\left(x^2 + 1/x\right)^{2n}$, prove that its coefficient is

$$\frac{(2n)!}{\left[\frac{1}{3}(4n - p)\right]!\left[\frac{1}{3}(2n + p)\right]!}.$$

**120.** If in the expansion of $(1 + x)^m(1 - x)^n$, the coefficients of $x$ and $x^2$ are 3 and -6 respectively, then m is:

**121.** If in the expansion of $(1 - x)^{2n-1}$ $a_r$ denotes the coefficient of $x^r$ then prove that $a_{r-1} + a_{2n-r} = 0$

**122.** If 3rd, 4th, 5th terms in the expansion of $(a + x)^n$ be 84, 280 and 560, Find x, a and n.

**123.** Find the number of terms which are free from radical signs in the expansion of $\left(y^{1/5} + x^{1/10}\right)^{55}$.

**124.** Find the 11th term form the beginning and the 11th term form the end I the expansion of $\left(2x - \dfrac{1}{x^2}\right)^{25}$.

**125.** Find the 7th term in the expansion of $\left( 3x^2 - \dfrac{1}{x^3} \right)^{10}$.

**126.** Find the 5th term from the end in the expansion of $\left( 3x - \dfrac{1}{x^2} \right)^{10}$.

**127.** Find the 7th term in the expansion of $\left( \dfrac{4x}{5} + \dfrac{5}{2x} \right)^{8}$.

**128.** Find the 4th term from the beginning and $4^{th}$ term from the end in the expansion of $\left( x + \dfrac{2}{x} \right)^9$

**129.** Find the 4th term from the end in the expansion of $\left( \dfrac{4x}{5} - \dfrac{5}{2x} \right)^8$.

**130.** Find the 7th term from the end in the expansion of $\left(2x^2 - \dfrac{3}{2x}\right)^8$.

**131.** Find the coefficient of $x^{10}$ in the expansion of $\left(2x^2 - \dfrac{1}{x}\right)^{20}$.

**132.** Find the coefficient of $x^7$ in the expansion of $\left(x - \dfrac{1}{x^2}\right)^{40}$.

**133.** Find the coefficient of : $x^{-15}$ in the expansion of $\left( 3x^2 - \dfrac{a}{3x^3} \right)^{10}$.

**134.** Find the coefficient of $x^9$ in the expansion of $\left( x^2 - \dfrac{1}{3x} \right)^9$.

**135.** Find the coefficient of $x^m$ in the expansion of $\left(x + \dfrac{1}{x}\right)^n$.

**136.** The co-efficient of x in the expansion of $\left(1 - 2x^3 + 3x^5\right)\left(1 + \dfrac{1}{x}\right)^8$ is:

**137.** Find the coefficient of $a^5 b^7$ in $(a - 2b)^{12}$

**138.** Find the coefficient of $x$ in the expansion of $\left(1 - 3x + 7x^2\right)(1 - x)^{16}$.

**139.** Does the expansion of $\left(2x^2 - \dfrac{1}{x}\right)^{20}$ contain any term involving $x^9$ ?

**140.** Show that the expansion of $\left(x^2 + \dfrac{1}{x}\right)^{12}$ does not contain any term involving $x^{-1}$.

**141.** Find the middle term in the expansion of $\left(\dfrac{2x}{3} - \dfrac{3}{2x}\right)^{20}$

**142.** Find the middle term in the expansion of :
$\left(x^2 - \dfrac{2}{x}\right)^{10}$

**143.** Find the middle term in the expansion of :

$$\left( \frac{a}{x} + bx \right)^{12}$$

**144.** Find the middle term in the expansion of :

$$\left( \frac{x}{a} - \frac{a}{x} \right)^{10}$$

**145.** Find the middle term in the expansionansion of $\left(3x - \dfrac{x^3}{6}\right)^9$.

**146.** Find the middle term in the expansion of :

$\left(3x - \dfrac{2}{x^2}\right)^{15}$

**147.** Find the middle term in the expansion of

$\left(2x^2 - \dfrac{1}{x}\right)^7$

**148.** Find the middle term in the expansion of :

$$\left( x^4 - \frac{1}{x^3} \right)^{11}$$

**149.** Find the middle term in the expansion of :

$$\left( x - \frac{1}{x} \right)^{10}$$

**150.** Find the middle term in the expansion of :

$$\left(1 + 3x + 3x^2 + x^3\right)^{2n}$$

**151.** Find the middle term in the expansion of :

$$\left(1 - 2x + x^2\right)^n$$

**152.** Find the middle term in the expansion of :

$$\left(2x - \frac{x^2}{4}\right)^9$$

**153.** The middle term of $\left( x - \dfrac{1}{x} \right)^{2n+1}$ is

**154.** Find the middle terms in the expansion $\left( 3x - \dfrac{x^3}{6} \right)^7$.

**155.** Find the middle term in the expansion of :

$$\left( \frac{p}{x} + \frac{x}{p} \right)^9$$

**156.** Find the middle term in the expansion of :

$$\left( \frac{x}{3} + 9y \right)^{10}$$

**157.** Find the middle term in the expansion of :

$$\left( 2ax - \frac{b}{x^2} \right)^{12}$$

A. $^{12}C_7 \left( \dfrac{2ab}{x} \right)^7$

B. $^{12}C_5 \left( \dfrac{2ab}{x} \right)^5$

C. $^{12}C_6 \left( \dfrac{2ab}{x} \right)^6$

D. none of these

**Answer: C**

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**158.** Find the middle term in the expansion of :
$\left( \dfrac{x}{a} - \dfrac{a}{x} \right)^{10}$

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**159.** Term independent of x in the expansion of

$$\left(3x^2 - \frac{1}{3x}\right)^9.$$

**160.** Find the term independent of x in the expansion of (a) $\left(\frac{\sqrt{x}}{3} + \frac{3}{2x^2}\right)^{10}$ (b) $\left(2x^2 - \frac{3}{x^3}\right)^{25}$

**161.** Find the term independent of x in the expansion of (a) $\left( \sqrt{\dfrac{x}{3}} + \dfrac{\sqrt{3}}{2x^2} \right)^{10}$ (b) $\left( 2x^2 - \dfrac{3}{x^3} \right)^{25}$

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**162.** Find the term independent o f x in the expansion of the following expressions: $\left( \dfrac{1}{2}x^{\frac{1}{3}} + x^{-\frac{1}{5}} \right)^8$ and $\left( \dfrac{3}{2}x^2 - \dfrac{1}{3x} \right)^9$

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**163.** Find the term independent of $x$ in the expansion off the following expression:

$$\left( \sqrt[3]{x} + \frac{1}{2\sqrt[3]{x}} \right)^{18}, \quad x > 0$$

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**164.** Find the term independent of $x$ in the expansion off the following expression:

$$\left( 2x + \frac{1}{3x^2} \right)^{9}$$

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**165.** Find the term independent of $x$ in the expansion off the following expression:

$$\left(3x - \frac{2}{x^2}\right)^{15}$$

**166.** Find the term independent of $x$ in the expansion off the following expression:

$$\left(x - \frac{1}{x^2}\right)^{3n}$$

**167.** Find the term independent of $x$ in the expansion of $\left[\left(3\dfrac{x^2}{2}\right) - \left(\dfrac{1}{3}x\right)\right]^9$

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**168.** Find the term independent of $x$ in the expansion off the following expression: $\left(\dfrac{3}{2}x^2 - \dfrac{1}{3x}\right)^6$

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**169.** If the coefficients of $(2r + 4)th$ term and $(r - 2)th$ term in the expansion of $(1 + x)^{18}$ are equal,find $r$.

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**170.** how that the coefficient of (r+1) th in the expansion of $(1 + x)^{n+1}$ is equal to the sum of the coefficients of the r th and (r+1) th term in the expansion of $(1 + x)^n$

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**171.** Prove that the term independent of $x$ in the expansion of $\left(x + \dfrac{1}{x}\right)^{2n}$ is $\dfrac{1.\,3.\,5...(2n-1)}{n!} \cdot 2^n$.

**172.** If the coefficients of 5th, 6th , and 7th terms in the expansion of $(1 + x)^n$ are in A.P., then $n =$ a. 7 only b. 14 only c. 7 or 14 d. none of these

**173.** If the coefficients of 2nd, 3rd and 4th terms in the expansion of $(1 + x)^n$ are in A.P. Then find the value of $n$.

**174.** If in the expansion of $(1 + x)^n$, the coefficients of pth and qth terms are equal, prove that $p + q = n + 2$, where $p \neq q$.

**175.** Find a if the coefficients of $x^2$ and $x^3$ in the expansion of $(3 + ax)^9$ are equal.

**176.** Find the coefficient of $a^4$ in the product $(1 + 2a)^4 (2 - a)^5$ using binomial theorem.

**177.** In the expansion of $(1 + x)^n$ the binomial coefficients of three consecutive terms are

respectively 220, 495 and 792 find the value of $n$.

**178.** If in the expansion of $(1 + x)^n$ the coefficient of three consecutive terms are 56,70 and 56, then find $n$ and the position of the terms of these coefficients.

**179.** If in any binomial expansion a, b, c and d be the 6th, 7th, 8th and 9th terms respectively, prove

that $\dfrac{b^2 - ac}{c^2 - bd} = \dfrac{4a}{3c}$

**180.** If the coefficients of three consecutive terms in the expansion of $(1 + x)^n$ be 76, 95 and 76 find $n$.

**181.** If the 6th, 7th, 8th terms in the expansion of $(x + a)^n$ be 112, 7 and 1/4 find x, y and n.

**182.** If the 2nd, 3rd and 4th terms in the expansion of $(x + a)^n$ are 240, 720 and 1080 respectively, find $x,\ a,\ n.$

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**183.** Find a, b and n in the expansion of $(a + b)^n$ if the first three terms of the expansion are 729, 7290 and 30375, respectively.

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**184.** If $p$ is a real number and if the middle term in the expansion of $\left(\dfrac{p}{2} + 2\right)^8$ is 1120, find $p$

**185.** Write the number of terms in the expansion of $\left(2 + \sqrt{3}x\right)^{10} + \left(2 - \sqrt{3}x\right)^{10}$.

**186.** Write the middle term in the expansion of $\left(\dfrac{2x^2}{3} + \dfrac{3}{2x^2}\right)^{10}$.

A. $^9C_5$

B. $^{10}C_5$

C. $^{10}C_6$

D. none of these

**Answer: B**

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**187.** Which term is independent of $x$ in the expansion of $\left(x - \dfrac{1}{3x^2}\right)^9$ ?

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**188.** If $a \; and \; b$ denote respectively the coefficients of $x^m and \; x^n$ in the expansion of $(1+x)^{m+n}$ , then write the relation between $a \; and \; b$.

**189.** Write the middle term in the expansion of $\left(x + \dfrac{1}{x}\right)^{10}$.

**190.** If $a \; and \; b$ denote the sum of the coefficients in the expansions of $\left(1 - 3x + 10x^2\right)^n and \left(1 + x^2\right)^n$ respectively, then write the relation between $a \; and \; b.$

**191.** Write the coefficient of the middle term in the expansion of $\left(1 + x\right)^{2n}.$

**192.** Find the sum of the coefficient of two middle terms in the binomial expansion of $(1+x)^{2n-1}$

**193.** If $a \ and \ b$ are the coefficients of $x^n$ in the expansions of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ respectively, find $\dfrac{a}{b}$.

**194.** The total number of terms in the expansion of $(x + a)^{100} + (x - a)^{100}$ is:

**195.** If

$$\left(1 - x + x^2\right)^n = a_0 + a_1 x + a_2 x^2 + + a_{2n} x^{2n},$$

find the value of $a_0 + a_2 + a_4 + + a_{2n}$.

**196.** If the rth term in the expansion of $(1 + x)^{20}$ has its coefficient equal to that of the (r+ 4)th term, find r

**197.** The term without $x$ in the expansion $\left(2x - \dfrac{1}{2x^2}\right)^{12}$ is a. 495 b. -495 c. -7920 d. 7920

**198.** If rth term in the expansion of $\left(2x^2 - \dfrac{1}{x}\right)^{12}$ is without $x$ then $r$ is equal to a. 7 b. 8 c. 9 d. 10

**199.** If in the expansion of $(a+b)^n$ and $(a+b)^{n+3}$, the ratio of the coefficients of second and third terms, and third and fourth terms respectively are equal, then $n$ is a. 3 b. 4 c. 5 d. 6

**200.** If $A$ and $B$ are the sums of odd and even terms respectively in the expansion of $(x + a)^n$ tehn $(x + a)^{2n} - (x - a)^{2n} =$

**201.** The number of irrational terms in the expansion of $\left( 4^{\frac{1}{5}} + 7^{\frac{1}{10}} \right)^{45}$ is

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

A. $1365$

B. $-1365$

C. $3003$

D. $-3003$

**Answer: B**

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**203.** In the expansion of $\left(x^2 - \dfrac{1}{3x}\right)^9$ the term without $x$ is equal to a. $\dfrac{28}{81}$ b. $\dfrac{-8}{243}$ c. $\dfrac{28}{243}$ d. none of these

**204.** If in the expansion of $(1 + x)^{15}$, the coefficients of $(2r + 3)^{th}$ and $(r - 1)^{th}$ terms are equal, then the value of $r$ is a. 5 b. 6 c. 4 d. 3

**205.** The middle term of the expansion of $\left(\dfrac{2x^2}{3} + \dfrac{3}{2x^2}\right)^{10}$ is a. 251 b. 252 c. 250 d. none of these

**206.** If in the expansion of $\left(x^4 - \dfrac{1}{x^3}\right)^{15}$, $x^{-17}$ occurs in rth term, then a. $r = 10$ b. $r = 11$ c. $r = 12$ d. $r = 13$

**207.** In the expansion of $\left( x - \dfrac{1}{3x^2} \right)^9$, the term independent of $x$ is a. $T_3$ b. $T_4$ c. $T_5$ d. none of these

**208.** If the coefficients of 5th, 6th , and 7th terms in the expansion of $(1 + x)^n$ are in A.P., then $n =$ a. 7 only b. 14 only c. 7 or 14 d. none of these

**209.** Find the term independent o f x in the expansion of the following expressions:

$$\left( \frac{1}{2} x^{\frac{1}{3}} + x^{-\frac{1}{5}} \right)^8$$

**210.** If A and B respectively denote the sum of the odd terms and sum of the even terms in the expansion of $(x + a)^n$, then the value of $(x^2 - a^2)^n$, is equal to

**211.** If the coefficient of x in $\left(x^2 + \dfrac{k}{x}\right)^5$ is 270, then k=

**212.** The coefficient of $x^4$ in $\left(x/2 - 3/x^2\right)^{10}$ is

A. $\dfrac{405}{256}$

B. $\dfrac{504}{259}$

C. $\dfrac{450}{263}$

D. none of these

**Answer: A**

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**213.** The number of terms in the expansion of $(x + a)^{100} + (x - a)^{100}$ after simplification

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**214.** If $\dfrac{T_2}{T_3}$ in the expansion of $(a + b)^n$ and $\dfrac{T_3}{T_4}$ in the expansion of $(a + b)^{n+3}$ are equal, then n is equal to

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**215.** The coefficient of $1/x$ in the expansion of $(1+x)^n(1+1/x)^n$ is $\dfrac{n!}{(n-1)!(n+1)!}$ b. $\dfrac{(2n)!}{(n-1)!(n+1)!}$ c. $\dfrac{(2n)!}{(2n-1)!(2n+1)!}$ d. none of these

**216.** The sum of the binomial coefficients of $\left[2x+\dfrac{1}{x}\right]^n$ is equal to $256$. The constant term in the expansion is: (A) 1120 (B) 2110 (C) 1210 (D) none

**217.** If the fifth term of the expansion $\left(a^{2/3} + a^{-1}\right)^n$ does not contain $'a'$. Then $n$ is equal to a. 2 b. 5 c. 10 d. none of these

**218.** The coefficient of $x^{-3}$ in the expansion of $\left(x - \dfrac{m}{x}\right)^{11}$ is a. $-924m^7$ b. $-792m^5$ c. $-792m^6$ d. $-330m^7$

**219.** The coefficient of the term independent of $x$ in the expansion of $\left(ax + \dfrac{b}{x}\right)^{14}$ is a. $14!a^7b^7$ b. $\dfrac{14!}{7!}a^7b^7$ c. $\dfrac{14!}{(7!)^2}a^7b^7$ d. $\dfrac{14!}{(7!)^3}a^7b^7$

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**220.** The coefficient $x^5$ in the expansion of

$(1+x)^{21} + (1+x)^{22} + \ldots\ldots\ldots + (1+x)^{30}$ is

A. $^{51}C_5$

B. $^9C_5$

C. $^{31}C_6 - ^{21}C_6$

D. $^{30}C_5 + ^{20}C_5$

**Answer: C**

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**221.** The coefficient of $x^8y^{10}$ in the expansion of $(x+y)^{18}$ is a. $^{18}C_8$ b. $^{18}P_{10}$ c. $2^{18}$ d. none of these

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**222.** If the coefficients of the $(n+1)^{th}$ term and the $(n+3)^{th}$ term in the expansion of $(1+x)^{20}$

are equal , then the value of $n$ is

A. 10

B. 8

C. 9

D. none of these

**Answer: C**

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**223.** If the coefficients of 2nd, 3rd and 4th terms in the expansion of $(1 + x)^n$ , $n \in \mathbb{N}$ are in A.P, then

$n$ is

A. 7

B. 14

C. 2

D. none of these

**Answer: A**

**224.** The middle term in the expansion of $\left(\frac{2x}{3} - \frac{3}{2x^2}\right)^{2n}$ is a. $^{2n}C_n$ b. $(-1)^n {}^{2n}C_n x^{-n}$ c.

$^{2n}C_n x^{-n}$ d. none of these

**225.** If $r^{th}$ term is the middle term in the expansion of $\left( x^2 - \dfrac{1}{2x} \right)^{20}$, then $(r + 3)^{th}$ term is

**226.** The number of terms with integral coefficients in the expansion of $\left( 17^{\frac{1}{3}} + 35^{\frac{1}{2}} x \right)^{600}$ is (A) 100 (B) 50 (C) 150 (D) 101

**227.** Constant term in the expansion of $\left(x - \dfrac{1}{x}\right)^{10}$ is a. $152$ b. $-152$ c. $-252$ d. $252$

**228.** If the coefficients of $x^2 and\ x^3$ in the expansion of $(3 + ax)^9$ are the same, then the value of $a$ is

A. $-\dfrac{7}{9}$

B. $-\dfrac{9}{7}$

C. $\dfrac{7}{9}$

D. $\dfrac{9}{7}$

**Answer: D**

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