MATHS

NCERT - NCERT MATHEMATICS (ENGLISH)

BINOMIAL THEOREM

Miscellaneous Exercise

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

2. 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 $\sqrt{6} : 1$

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

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

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

6. 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.

7. Find the value of $\left(a^2 + \sqrt{a^2 - 1}\right)^4 + \left(a^2 - \sqrt{a^2 - 1}\right)^4$.

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

9. If a and b are distinct integers, prove that $a - b$ is a factor of $a^n - b^n$, whenever n is a positive integer.

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

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Exercise 8 2

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

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

3. Write the general term in the expansion of $(x^2 - y)^6$

4. Find the coefficient of x^5 in $(x + 3)^8$

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

6. Write the general term in the expansion of $\left(x^2 - yx\right)^{12}, x \neq 0$

Exercise 8 1

1. Expand of the expression : $\left(\dfrac{x}{3} + \dfrac{1}{x}\right)^5$

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2. Expand of the expression : $\left(x + \dfrac{1}{x}\right)^6$

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3. Using binomial theorem, evaluate : $(96)^3$

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4. Using binomial theorem, evaluate : $(102)^5$

5. Expand of the expression : $(1 - 2x)^5$

6. Expand of the expression : $\left(\dfrac{2}{x} - \dfrac{x}{2} \right)^5$

7. Expand of the expression : $(2x - 3)^6$

8. Using binomial theorem, evaluate : $(101)^4$

9. Using binomial theorem, evaluate : $(99)^5$

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

11. Show that $9^{n+1} - 8n - 9$ is divisible by 64, where n is a positive integer.

12. Find $(x+1)^6 + (x-1)^6$. Hence or otherwise evaluate $\left(\sqrt{2}+1\right)^6 + \left(\sqrt{2}-1\right)^6$.

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

14. Using binomial theorem, indicate which number is larger $(1.1)^{10000}$ or 1000.

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

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2. The second, third and fourth terms in the binomial expansion $(x + a)^n$ are 240, 720 and 1080, respectively. Find x, a and n.

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3. Which is larger $(1.01)^{10000000}$ or 10,000?

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4. Compute $(98)^5$.

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5. Expand $\left(x^2 + \dfrac{3}{x}\right)^4$, $x \neq 0$

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

7. Show that the middle term in the expansion of $(1 + x)^{2n}$ is $\dfrac{1.3.5...(2n - 1)}{n!} \cdot 2^n \cdot x^n$, where $n \in N$.

8. Find a if the 17th and 18th terms of the expansion $(2 + 1)^{50}$ are equal.

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

10. Find the term independent of x in the expansion of $\left(\dfrac{3}{2}x^2 - \dfrac{1}{3x}\right)^6$.

11. 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 $n^2 - on(4r+1) + 4r^2 - 2 = 0$.

12. Show that the coefficient of the middle term in the expansion of $(1 + x)^{2n}$ is equal to the sum of the coefficients of two middle terms in the expansion of $(1 + x)^{2n-1}$.

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

14. Find the rth term from the end in the expansion of $(x + a)^n$.

15. Find the term independent of x in the expansion of $\left(\dfrac{3}{2} x^2 - \dfrac{1}{3x} \right)^6$.

16. The sum of the coefficients of the first three terms 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.

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