MATHS

NCERT - FULL MARKS MATHEMATICS(TAMIL)

BINOMIAL THEOREM

Example

1. Expand $\left(X^2 + \frac{3}{x}\right)^4$, x != 0

Watch Video Solution

2. Compute $(98)^5$.

Watch Video Solution

3. Which is larger $(1.01)^{1000000}$ or 10,000?

Watch Video Solution

4. Using Binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by 25 for all positive integer n.

Watch Video Solution

5. Find a if the $17^t h$ and $18^t h$ terms of the expansin $(2+a)^{50}$ are equal.

Watch Video Solution

6. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.....(2n-1)}{n!}2^n x^n$, where n is a positive integer.

Watch Video Solution

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

Watch Video Solution

8. If the 2nd, 3rd and 4th terms in the binomial expansion of $(x+a)^n$ are 240, 720 and 1080 for a suitable values of x, find x, a and n.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

11. If the coefficients of $a^r - 1$, a^r and $a^r + 1$ in the expansion of $(1 + a)^n$ are in arithmetic progression, prove that n^2 - n(4r+1)+$4r^2$ - 2 =0.

Watch Video Solution

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

Watch Video Solution

13. Find the confficient of x^5 in the product $(1 + 2x)^6 \ (1 - x)^7$ using binomial theoram.

Watch Video Solution

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

Watch Video Solution

15. Find the term independent of x in the expansion of $\left(\sqrt[3]{x}+\frac{1}{2\sqrt[3]{x}}\right)^{18}$, $x>0$.

Watch Video Solution

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

Watch Video Solution

17. Find the expansion of $(2x+3)^5$.

View Text Solution

18. Evaluate 98^4.

View Text Solution

19. Find the middle term in the expansion of $(x + y)^6$.

View Text Solution

20. Find the middle terms in the expansion of $(x + y)^7$.

View Text Solution

21. Find the coefficient of x6 in the expansion of $(3 + 2x)^{10}$.

View Text Solution

22. Find the coefficient of x3 in the expansion of $(2 - 3x)^7$.

View Text Solution

23. The 2^{Nd}, 3^{rd} and 4^{th} terms in the binomial expansion of $(x+a)^n$ are 240, 720 and 1080 for a suitable value of x. Find x, a and n.

View Text Solution

24. Expand $\left(2x - \frac{1}{2x}\right)^4$.

View Text Solution

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

View Text Solution

26. Using Binomial theorem ,prove that $6^n - 5n$ always leaves remainder 1 when divided by 25 for all positive integer n.

View Text Solution

27. If the 5^{th} and 9^{th} terms of a harmonic progression are $\frac{1}{19}$ and $\frac{1}{35}$,find the 12^{th} term of the squence.

View Text Solution

28. If the product of the $4^{th}, 5^{th}$ and 6^{Th} terms of a geometric progression is 4096 and if the product of the $5^{th}, 6^{th}$ and 7^{th} terms of it is 32768 ,find the sum of first 8 terms of the geometric progression.

View Text Solution

29. Find the sum up to n terms of the series : $1+\frac{6}{7}+\frac{11}{49}+\frac{16}{343}+....$

View Text Solution

30. Find the sum of the first n terms of the series $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+...$

View Text Solution

31. Find $\sum_{k=1}^{n} \frac{1}{k(k+1)}$.

View Text Solution

32. Find the sum : $1 + \frac{4}{5} + \frac{7}{25} + \frac{10}{125} + \ldots$

View Text Solution

33. Find $\sum_{n=1}^{\infty} \frac{1}{n^2 + 5n + 6}$.

View Text Solution

34. Expand $\frac{1}{(3+2x)^2}$ in powers of x. Find a condition on x for which the expansion is valid .

View Text Solution

35. Find $\sqrt[3]{65}$.

View Text Solution

36. Prove that $\sqrt[3]{x^3+7}-\sqrt[3]{x^3+4}$ is approximately equal to $\frac{1}{x^2}$ when x is large.

View Text Solution

Exercise 8 1

1. Expand the expression

$(1-2x)^5$

Watch Video Solution

2. Expand the expression

$$\left(\frac{2}{x} - \frac{x}{2}\right)^5$$

Watch Video Solution

3. Expand the expression

$$(2x - 3)^6$$

Watch Video Solution

4. Expand the expression

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

Watch Video Solution

5. Expand the expression

$$\left(x + \frac{1}{x}\right)^6$$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

10. Using Binomial Theorem, indicate which number is larger $(1.1)^{10000}$ or 1000.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

13. Show that 9^n+1 - 8n - 9 is divisible by 64, whenever n is a positive interger.

Watch Video Solution

14. Prove that $\sum_{r=0}^{n} 3^r n\, C_r = 4^n$.

Watch Video Solution

Exercise 8 2

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

6. Find the$13t^t h$ term in the expansion of $\left(9x - \frac{1}{3}\sqrt{x}\right)^{18}$, x !=0.

View Text Solution

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

Watch Video Solution

8. Find the middle terms in the expansions of $\left(\frac{x}{3}+9Y\right)^{10}$.

Watch Video Solution

9. In the expansion of $(1+a)^m+n$, prove that coefficients of a^m and a^n are equal.

Watch Video Solution

10. The coeffcients of the $(r-1)^th$, r^th and $(r+1)^th$ terms in the expansion of $(x+1)^n$ are in the ration 1 : 3: 5 Find n and r.

Watch Video Solution

11. Prove that the coefficient of x^n in the expansion of $(1+x)^2n$ is twice the coefficient of x^n in the expansion of $(1+x)^2n-1$.

Watch Video Solution

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

Watch Video Solution

Miscellanous Exercise On Chapter 8

1. 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.

Watch Video Solution

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

Watch Video Solution

3. Find the confficient of x^5 in the product $(1+2x)^6\ (1-x)^7$ using binomial theoram.

Watch Video Solution

4. 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.

Watch Video Solution

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

View Text Solution

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

Watch Video Solution

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

Watch Video Solution

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

View Text Solution

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

Watch Video Solution

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

Watch Video Solution

Exercise 5 1

1. Expand

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

View Text Solution

2. Expand

$$\left(2x^2 - 3\sqrt{1-x^2}\right)^4 + \left(2x^2 + 3\sqrt{1-x^2}\right)^4$$

View Text Solution

3. Compute

$$102^4$$

View Text Solution

4. Compute

99^4

View Text Solution

5. Compute

9^7.

View Text Solution

6. Using binomial theorem, indicate which of the following two number is larger . $(1.01)^{1000000}$, 10000 .

View Text Solution

7. Find the coefficient of x^{15} in $\left(x^2+\frac{1}{x^3}\right)^{10}$.

View Text Solution

8. Find the coefficient of x^6 and the cofficient of x^2 in $\left(x^2 - \frac{1}{x^3}\right)^6$.

View Text Solution

9. Find the coefficient of x^6 and the expansion of $(1+x^3)^{50}\left(x^2 + \frac{1}{x}\right)^5$.

View Text Solution

10. Find the constant term of $\left(2x^3 - \frac{1}{3x^2}\right)^5$.

View Text Solution

11. Find the last two digits of the number 3^{600}.

View Text Solution

12. In the binomial expansion of $(a+b)^n$,the coefficients of the 4^{th} and 13^{th} terms are equal to each other ,find n.

View Text Solution

13. If the binomial coefficients of three consecutive terms in the expansion of $(a+x)^n$ are in the ratio $1:7:42$,then find n.

View Text Solution

14. In the binomial coefficients of $(1+x)^n$,the coefficients of the 5^{th}, 6^{th} and 7^{th} terms are in AP. Find all values of n.

View Text Solution

Exercise 5 2

1. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression and none of them.

$$\frac{1}{2^{n+1}}$$

View Text Solution

2. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression and none of them.

$$\frac{(n+1)(n+2)}{n+3(n+4)}$$

View Text Solution

3. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric

progression, arithmetico-geometric progression, harmonic progression and none of them.

$4\left(\frac{1}{2}\right)^n$

View Text Solution

4. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression and none of them

$\frac{(-1)^n}{n}$

View Text Solution

5. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression

and none of them

$$\frac{2n+3}{3n+4}$$

View Text Solution

6. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression and none of them

2018

View Text Solution

7. Write the first 6 terms of the sequences whose n^{th} terms are given below and classify them as arithmetic progression, geometric progression, arithmetico-geometric progression, harmonic progression and none of them

$$\frac{3n-2}{3n-1}$$

View Text Solution

8. Write the first 6 terms of the sequences whose n^{th} term a_n is given below.

$$a_n = \begin{cases} n+1 & \text{if n is odd} \\ n & \text{if n is even} \end{cases}$$

View Text Solution

9. Write the first 6 terms of the sequences whose n^{th} term a_n is given below.

$$a_n = \begin{cases} 1 & \text{if n=1} \\ 2 & \text{if n=2} \\ a_{n-1} + a_{n-2} & \text{if } n > 2 \end{cases}$$

View Text Solution

10. Write the first 6 terms of the sequences whose n^{th} term a_n is given below.

$$a_n = \begin{cases} n & \text{if n is 1,2or3} \\ a_{n-1} + a_{n-2} + a_{n-3} & \text{if } n > 3 \end{cases}$$

View Text Solution

11. Write the n^{th} term of the following sequences.

$2, 2, 4, 4, 6, 6,...$

View Text Solution

12. Write the n^{th} term of the following sequences.

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6},...$

View Text Solution

13. Write the n^{th} term of the following sequences.

$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10},...$

View Text Solution

14. Write the n^{th} term of the following sequences.

$6, 10, 4, 12, 2, 14, 0, 16, -2,...$

View Text Solution

15. The product of three in creasing number sin GP is 5832.Ifwe add 6 to the second number and 9 to the third number, then resulting numbers form an AP. Find the numbers in GP.

View Text Solution

16. Write the n^{th} term of the sequence $\frac{3}{1^2 2^2}, \frac{5}{2^2 3^2}, \frac{7}{3^2 4^2}, ...$ as a difference of two terms.

View Text Solution

17. The AM of two numbers exceeds their GM by 10 and HM by 16 . Find the numbers.

View Text Solution

Exercise 5 3

1. Find the sum of the first 20-terms of the arithmetic progression having the sum of first 10 terms as 52 and the sum of the first 15 terms as 77.

View Text Solution

2. Find the sum up to the 17^{th} term of the series $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\ldots$

View Text Solution

3. Compute the sum of first n terms of the following series:

$8 + 88 + 888 + 8888 + ...$

View Text Solution

4. Compute the sum of first n terms of the following series:

$6 + 66 + 666 + 6666 + ...$

View Text Solution

5. Compute the sum of first n terms of

$1 + (1 + 4) + (1 + 4 + 4^2) + (1 + 4 + 4^2 + 4^3) + ...$

View Text Solution

6. Find the general term and sum to n terms of the sequence

$1, \frac{4}{3}, \frac{7}{9}, \frac{10}{27}, ...$

View Text Solution

7. Find the value of n, if the sum to n terms of the series $\sqrt{3}+\sqrt{75}+\sqrt{243}+\ldots$ is $432\sqrt{3}$.

View Text Solution

8. A man repays an amount of Rs.3250 by paying Rs.20 in the first month and then increases the payment by Rs.15 per month. How long will it take him to clear the amount?

View Text Solution

9. In a race, 20 balls are placed in a line at intervals of 4 meters, with the first ball 24 meters away from the starting point. A contestant is required to bring the balls back to the starting place one at a time. How far would the contestant run to bring back all balls?

View Text Solution

10.

Thenumberofbacteriainacertainculturedoubleseveryhour.Iftherewere30bacter

the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and nth hour?

View Text Solution

11.

WhatwillRs.500amountstoin10yearsafteritsdepositinabankwhichpaysannualin

of 10% compounded annually?

View Text Solution

12. In a certain town, a viral disease caused severe health hazards upon its people disturbing their normal life. Itwas foundthat on each day, thevirus whichcausedthe disease spreadin Geometric Progression. The amount of

infectious virus particle gets doubled each day, being 5 particles on the first day. Find the day when the infectious virus particles just grow over 1,50,000 units?

View Text Solution

Exercise 5 4

1. Expandthefollowinginascendingpowersof x andfindtheconditionon x forwhichthebinomial expansion is valid.

$$\frac{1}{5+x}$$

View Text Solution

2. Expandthefollowinginascendingpowersof x andfindtheconditionon x forwhichthebinomial expansion is valid.

$$\frac{2}{(3+4x)^2}$$

View Text Solution

3. Expandthefollowinginascendingpowersof x andfindtheconditionon x forwhichthebinomial expansion is valid.

$(5+x^2)^{\frac{2}{3}}$

View Text Solution

4. Expandthefollowinginascendingpowersof x andfindtheconditionon x forwhichthebinomial expansion is valid.

$(x+2)^{-\frac{2}{3}}$

View Text Solution

5. Find $\sqrt[3]{1001}$ approximately (two decimal places).

View Text Solution

6. Write the first 6 terms of the exponential series

e^{5x}

View Text Solution

7. Write the first 6 terms of the exponential series

e^{-2x}

View Text Solution

8. Write the first 6 terms of the exponential series

$e^{\frac{1}{2}x}$

View Text Solution

9. Write the first 4 terms of the logarithmic series

$\log(1+4x)$ Find the intervals on which the expansions are valid.

View Text Solution

10. Write the first 4 terms of the logarithmic series

$\log(1-2x)$ Find the intervals on which the expansions are valid.

View Text Solution

11. Write the first 4 terms of the logarithmic series

$\log\left(\frac{1+3x}{1-3x}\right)$ Find the intervals on which the expansions are valid.

View Text Solution

12. Write the first 4 terms of the logarithmic series

$\log\left(\frac{1-2x}{1+2x}\right)$.Find the intervals on which the expansions are valid.

View Text Solution

13. If p-q is small compared to either p or q, the show that $\sqrt[n]{\frac{p}{q}} \cong \frac{(n+1)p+(n-1)q}{(n-1)p+(n+1)q}$.Hence find $\sqrt[8]{\frac{15}{16}}$.

View Text Solution

14. Find the coefficient of x^4 in the expansion of $\frac{3-4x+x^2}{e^{2x}}$

View Text Solution

15. Find the value of $\sum_{n=1}^{\infty} \frac{1}{2n-1}\left(\frac{1}{9^{n-1}}+\frac{1}{9^{2n-1}}\right)$.

View Text Solution

Exercise 5 5

1. Choose the correct or the most suitable answer.

The value of 2+4+6+····+2n is

A. $\frac{n(n-1)}{2}$

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

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

D. $n(n+1)$

Answer: D

View Text Solution

2. The coefficient of x^6 in $(2+2x)^{10}$ is

A. ${}^{10}C_6$

B. 2^6

C. ${}^{10}C_6 2^6$

D. ${}^{10}C_6 2^{10}$.

Answer: D

View Text Solution

3. The coefficient of x^8y^{12} in the expansion of $(2x+3y)^{20}$ is

A. 0

B. $2^8 3^{12}$

C. $2^8 3^{12} + 2^{12} 3^8$

D. ${}^{20}C_8 2^8 3^{12}$.

Answer: D

View Text Solution

4. If ${}^nC_{10} > {}^nC_r$ for all possible r , then a value of n is

A. 10

B. 21

C. 19

D. 20

Answer: D

View Text Solution

5. If a is the arithmetic mean and g is the geometric mean of two numbers, then

A. $a \leq g$

B. $a \geq g$

C. a=g

D. $a > g$.

Answer: B

View Text Solution

6. If $\left(1+x^2\right)^2(1+x)^n = a_0 + a_1x + a_2x^2 + \ldots + x^{n+4}$ and if a_0, a_1, a_2 are in AP , then n is

A. 1

B. 2

C. 3

D. 4

Answer: C

View Text Solution

7. If a,8 ,b are in AP,a,4b are in GP , and if a,x,b are in HP then x is

A. 2

B. 1

C. 4

D. 16

Answer: A

View Text Solution

8. The sequence $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}+\sqrt{2}}, \frac{1}{\sqrt{3}+2\sqrt{2}}$,... form an

A. AP

B. GP

C. HP

D. AGP.

Answer: C

View Text Solution

9. The HM of two positive numbers whose AM and GM are 16,8 respectively is

A. 10

B. 6

C. 5

D. 4

Answer: D

View Text Solution

10. If S_n denotes the sum of n terms of an AP whose common difference is d,the value of $S_n - 2S_{n-1} + S_{n-2}$ is

A. 0

B. 2d

C. 4d

D. d^2.

Answer: A

View Text Solution

11. The remainder when 38^{15} is divided by 13 is

A. 12

B. 1

C. 11

D. 5

Answer: A

View Text Solution

12. The n^{th} term of the sequence 1,2,4,7,11,... is

A. $n^3 + 3n^2 + 2n$

B. $n^3 - 3n^2 + 3n$

C. $\frac{n(n+1)(n+2)}{3}$

D. $\frac{n^2 - n + 2}{2}$

Answer: D

View Text Solution

13. The sum up to n terms of the series $\frac{1}{\sqrt{1}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{7}} + \ldots$ is

A. $\sqrt{2n+1}$

B. $\frac{\sqrt{2n+1}}{2}$

C. $\sqrt{2n+1} - 1$

D. $\frac{\sqrt{2n+1} - 1}{2}$

Answer: D

View Text Solution

14. The n^{th} term of the sequence $\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, \frac{15}{16}$,... is

A. $2^n - n - 1$

B. $1 - 2^{-n}$

C. $2^{-n} + n - 1$

D. 2^{n-1}

Answer: B

View Text Solution

15. The sum up to n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32}$+... is

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

B. $2n(n+1)$

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

D. 1

Answer: C

View Text Solution

16. The value of the series $\frac{1}{2}+\frac{7}{4}+\frac{13}{8}+\frac{19}{16}$+.... is

A. 14

B. 7

C. 4

D. 6

Answer: B

View Text Solution

17. The sum of an infinite GP is 18. If the first term is 6, the common ratio is

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{6}$

D. $\frac{3}{4}$.

Answer: B

View Text Solution

18. The coefficient of x^5 in the series e^{-2x} is

A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. $\frac{-4}{15}$

D. $\frac{4}{15}$.

Answer: C

View Text Solution

19. The value of $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+$ ...is

A. $\frac{e^2+1}{2e}$

B. $\frac{(e+1)^2}{2e}$

C. $\frac{(e-1)^2}{2e}$

D. $\frac{e^2+1}{2e}$

Answer: C

View Text Solution

20. The value of $1-\frac{1}{2}\left(\frac{2}{3}\right)+\frac{1}{3}\left(\frac{2}{3}\right)^2-\frac{1}{4}\left(\frac{2}{3}\right)^3+$... is

A. $\log\left(\frac{5}{3}\right)$

B. $\frac{3}{2}\log\left(\frac{5}{3}\right)$

C. $\frac{5}{3}\log\left(\frac{5}{3}\right)$

D. $\frac{2}{3}\log\left(\frac{2}{3}\right)$.

Answer: B

View Text Solution