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Class: 11
Subject: Math's
Topic: Binomial Theorem
No. of Questions: 25

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

   A. 56
   B. 55
   C. 47
   D. 19

2. If a is real and the 4^{th} term in the expansion of $\left(ax+\frac{1}{x}\right)^n$ is 5/2, for each $x \in R - \{0\}$, then the values of a and n, respectively, are

   A. 5, 1/2
   B. 6, – 1/2
   C. 3, 1/3
   D. 6, ½

3. If $(r + 1)^{th}$ term in the expansion of $\left(\frac{a^{1/3}}{b^{1/6}}+\frac{b^{1/2}}{a^{1/6}}\right)^{21}$ has equal exponents of both a and b, then the value of r is

   A. 8
   B. 9
   C. 10
   D. 11

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4. If x^{2k} occurs in the expansion of $\left(x + \frac{1}{x^2}\right)^{n-3}$, then

A. n – 2k is a multiple of 2
B. n – 2k is a multiple of 3
C. k = 0
D. none of these

5. If $(1 + x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, then the value of $C_0 + 2C_1 + 3C_2 + \ldots + (n+1)C_n$ is

A. 2^{n-1}
B. $n(2^{n-1})$
C. $n(2^{n-1}) + 2^n$
D. $(n + 1)2^n$

6. If $n \in N$, $n > 1$, then value of $E = a - {}^nC_1 (a - 1) + {}^nC_2 (a - 2) + \ldots + (-1)^n (a - n) ({}^nC_n)$ is

A. a
B. 0
C. a^2
D. 2^n

7. For $n \geq 2$, let $a_n = \sum_{r=0}^{n} \frac{1}{C_r^2}$, then value of $b_n = \sum_{r=1}^{n} \frac{1}{r^2 C_r^2}$ equals

A. $\frac{1}{n^2} a_n$
B. $\frac{1}{n^2} a_{n-1}$
C. a_n
D. a_n^2

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8. Sum of the coefficients of x^3 and x^6 in the expansion of $\left(x^2 - \frac{1}{x}\right)^9$ is

9. The coefficient of x^n in the expansion of $\left(1 + \frac{1}{1!}x + \frac{1}{2!}x^2 .. + \frac{1}{n!}x^n\right)^2$ is

A. $\frac{2^n}{n!}$
B. $\frac{2^n}{n}$
C. n!
D. $\frac{1}{n!}$

10. The coefficient of x^7 in the expansion of $(1 - x - x^2 + x^3)^6$ is

A. 132
B. 144
C. 132
D. 144

11. Suppose F is the fractional part of $M = (\sqrt{13} + \sqrt{11})^6$, then value of M (1 – F) is

A. 128
B. 64
C. 32
D. 16

12. Sum of two middle terms in the expansion of $(1 + x)^{2n-1}$ is

A. ${}^{2n-1}C_{n-1}$
B. ${}^{2n-1}C_n$
C. ${}^{2n}C_n$
D. ${}^{2n}C_{n+1}$

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13. What will be the sixth term in the expansion of $(x^{1/3} + y^{1/2})^n$, if the binomial coefficient of the third term from the end is 45?

A. $252\, x^{5/3}\, y^{5/2}$
B. 45
C. $45\, x^{5/3}\, y^{5/2}$
D. None of these

14. Coefficient of $\frac{1}{x}$ in the expansion of $(1 + x)^n (1 + 1/x)^n$ is

A. ${}^{2n}C_{n-1}$
B. ${}^{2n}C_n$
C. 1
D. 0

15. The last term in the binomial expansion of $\left(\sqrt{2} - \frac{1}{\sqrt{2}}\right)^n$ is $\left(\frac{1}{3.9^{\frac{1}{3}}}\right)^{\log_3 8}$, then the 5th term from the beginning is

A. ${}^{10}C_6$
B. $2({}^{10}C_4)$
C. $\frac{1}{2}({}^{10}C_4)$
D. $-{}^{10}C_6$

16. Let S (K) be$1 + 3 + 5 + \ldots + (2K - 1) = 3 + K^2$. Which of the following is true?

A. S (K) $\not\Rightarrow$ S (K + 1)
B. S (K) $\Rightarrow$ S (K + 1)
C. S (1) is correct.
D. Principle of mathematical induction can be used to prove the formula.

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17. The interval in which x (> 0) must lie so that the greatest term in the expansion of $(1 + x)^{2n}$ has the greatest coefficient is

A. $\left(\frac{n-1}{n}, \frac{n}{n-1}\right)$
B. $\left(\frac{n}{n+1}, \frac{n+1}{n}\right)$
C. $\left(\frac{n}{n+2}, \frac{n+2}{n}\right)$
D. none of these

18. Sum of the series $S = 3^{-1}\,(^{10}C_0) - {}^{10}C_1 + (3)(^{10}C_2) - 3^2(^{10}C_3) + \ldots + 3^9\,(^{10}C_{10})$ is

A. 2^9
B. $2^{10} - 1$
C. $\frac{1}{3}(2^{11} - 2)$
D. $\frac{1}{3}(2^{10})$

19. Let $(1 + x)^{3n}$ be $C_0 + C_1x + C_2x^2 + \ldots + C_{3n}x^{3n}$, and $\omega \neq 1$ be a cube root of unity.
Statement-1: $C_0 + C_1\omega + C_2\omega^2 + C_3 + C_4\omega + C_5\omega^2 + \ldots = (-1)^n$
Statement-2: Cube roots unity form a triangle of area 3 square units.

A. Statement – 1 is true, statement – 2 is true and statement – 2 is the correct explanation for statement – 1.
B. Statement – 1 is true, statement – 2 is true and statement – 2 is not the correct explanation for Statement – 1.
C. Statement – 1 is true, statement – 2 is false.
D. Statement – 1 is false, statement – 2 is true.

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20. Let $(1 + x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$.

Statement - 1: For $m \geq 2$, $C_0 - C_1 + C_2 - \ldots + (-1)^{m-1} C_{m-1} = (-1)^{m-1} ({}^{n-1}C_{m-1})$

Statement - 2: ${}^nC_r = {}^{n-1}C_{r-1} + {}^{n-1}C_r$ for $1 \leq r \leq n - 1$

A. Statement – 1 is true, statement – 2 is true and statement – 2 is the correct explanation for statement – 1.
B. Statement – 1 is true, statement – 2 is true and statement – 2 is not the correct explanation for Statement – 1.
C. Statement – 1 is true, statement – 2 is false.
D. Statement – 1 is false, statement – 2 is true.

21. Let $(1 + t)^n = C_0 + C_1t + C_2t^2 + \ldots + C_nt^n$.

Statement - 1:

Statement - 2:

$$\frac{C_0}{1.2} + \frac{C_1}{2.3} + \frac{C_2}{3.4} + \ldots + \frac{C_n}{(n+1)(n+2)} = \frac{1}{n+1}\left[\frac{2^{n+2}}{n+2} - 1\right]$$

$$\frac{C_0}{2} - \frac{C_1}{3} + \frac{C_2}{4} - \ldots + (-1)^n \frac{C_n}{n+2} = 0$$

A. Statement – 1 is true, statement – 2 is true and statement – 2 is the correct explanation for statement – 1.
B. Statement – 1 is true, statement – 2 is true and statement – 2 is not the correct explanation for Statement – 1.
C. Statement – 1 is true, statement – 2 is false.
D. Statement – 1 is false, statement – 2 is true.

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

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

24. Find the value of r, if the coeff of $(2r + 4)^{th}$ and $(r-2)^{th}$ terms in the expansion of $(1 + x)^{18}$ are equal.

25. If three successive coeff. In the expansion of $(1+x)^n$ are 220, 495 and 792 then find n

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