MATHS

BOOKS - MTG WBJEE MATHS (HINGLISH)

BINOMIAL THEOREM

Wb Jee Workout Category 1 Single Option Correct Type 1 Mark

1. If the sum of the coefficients in the expansion of $(p+q)^n$ is 1024, then the greatest coefficient in the expansion is

A. $^{10}C_5$

B. $^{10}C_4$

C. $^{10}C_2$

D. None of these

Answer: A

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2. The number of terms in the expansion of $\left[(x+2y)^4 \times (x-2y)^4\right]^2$ are

A. 8

B. 7

C. 9

D. 50

Answer: C

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

A. 6

B. 8

C. 5

D. 7

Answer: D

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4. Middle term in the expansion of $(1+x)^{4n}$ is $(\forall n \in N)$

A. $(2n+1)^{th}$

B. $2n^{th}$

C. $(2n-1)^{th}$

D. None of these

Answer: A

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5. If the binomial coefficient of $(2r+4)^{th}$ term and $(r-2)^{th}$ term in the expansion of $(1+x)^{21}$ are equal, then the value of r equals

A. 6

B. 5

C. 7

D. 8

Answer: C

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6. Given positive integers rgt1,ngt2 and the cofficients of (3r)^(th) and (r+2)^(th)$term \in the \exp ansionof$(1+x)^(2n)` are equal then, which of the following relation is correct?

A. $n = 3r$

B. $n = 2r + 1$

C. $n = 2r - 1$

D. $n = 2r$

Answer: D

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7. If the sum of the coefficient in the expansion of $(\alpha x^2 - 2x + 1)^{35}$ is equal to the sum of the coefficient of the expansion of $(x - \alpha y)^{35}$, then α =

A. -1

B. 1

C. 0

D. None of these

Answer: B

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8. The vaule of $\sum_{r=0}^{n-1}\left(\frac{C_r}{{}^nC_r+{}^nC_{r+1}}\right.$ is equal to

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

B. $\frac{n+1}{n-1}$

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

D. $\frac{n}{2}$

Answer: D

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9. If $a_n=\sum_{r=0}^{n}\frac{1}{nC_r}$, then $\sum_{r=0}^{n}\frac{r}{nC_r}$ equals

A. a_n+1

B. a_n-1

C. a_n

D. $2a_n$

Answer: B

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10. Number of terms in the expansion of $(1-x)^{51}\left(1+x+x^2\right)^{50}$ is

A. 50

B. 51

C. 100

D. 102

Answer: D

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11. The expression

$\left[x+\left(x^3-1\right)^{\frac{1}{2}}\right]^5+\left[x-\left(x^3-1\right)^{\frac{1}{2}}\right]^5$ is a polynomial of degree

A. 15

B. 7

C. 6

D. 5

Answer: B

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12. Find the two consecutive terms in the expansion of $(3+2x)^{74}$ so that the coefficients of powers of x are equal.

A. 30^{th} and 31^{st} terms

B. 29^{th} and 30^{th} terms

C. 31^{st} and 32^{nd} terms

D. 28^{th} and 29^{th} terms

Answer: A

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13. Find the coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^{11}$

A. 330

B. 990

C. 900

D. 895

Answer: B

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14. The coefficient of x^{53} in the expansion $\sum_{m=0}^{100} \hat{}\ (100)C_m(x-3)^{100-m}2^m$ is $\hat{}\ 100C_{47}$ b. $\hat{}\ 100C_{53}$ c. $-^{100}C_{53}$ d. none of these

A. $^{100}C_{53}$

B. $^{101}C_{53}$

C. $-^{100}C_{53}$

D. $^{100}C_{48}$

Answer: C

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15. The middle term in the expansioin of $(1+x)^{2n}$ is

A. $2.\ ^nC_n$

B. $\frac{1.3.5.\ldots\ldots(2n-1)}{n!}2^n$

C. $2.6.10.\ldots\ldots(4n-2)$

D. None of these

Answer: B

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

A. -1

B. 1

C. 0

D. None of these

Answer: C

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17. In the expansion of $\left(1+x+x^2+\ldots\infty\right)^3$ the coefficient of x^n is

A. -3

B. 3

C. 9

D. -9

Answer: B

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18. If the magnitude of the coefficient of x^7 in the expansion of $\left(ax^2+\frac{1}{bx}\right)^8$, where a, b are positive numbers,is equal to the magnitude of the coefficient of x^{-7} in the expansion of $\left(ax+\frac{1}{bx^2}\right)^8$, then a and b are connected by the relation

A. $ab=1$

B. $ab=2$

C. $a^2b = 1$

D. $ab^2 = 2$

Answer: A

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19. The sum of the coefficients of the first 10 terms in the expansion of $(1 - x)^{-3}$ is

A. 220

B. 286

C. 120

D. 150

Answer: A

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20. The coefficient of x^{-10} in $\left(x^2 - \frac{1}{x^3}\right)^{10}$, is

A. 252

B. -210

C. 120

D. 150

Answer: C

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21. If $C_0, C_1, C_2, \ldots, C_n$ denote the binomial coefficients in the expansion of $(1+x)^n$, then .

1. $C_1 - 2.\ C_2 + 3.\ C_3 - 4.\ C_4 + \ldots + (-1)^{n-1} nC_n =$

A. $n.\ 2^{n-1}$

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

C. $(n+1)2^n$

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

Answer: A

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

A. $3/7$

B. $7/3$

C. $7/9$

D. $9/7$

Answer: D

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23. If in the expansion of $(a-2b)^n$, the sum of 5^{th} and 6^{th} terms is 0, then th e values of a/b=

A. $\frac{n-4}{5}$

B. $\frac{2(n-4)}{5}$

C. $\frac{5}{n-4}$

D. $\frac{5}{2(n-4)}$

Answer: B

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24. Find the sum of the last 30 coefficients in the expansion of $(1+x)^{59}$, when expanded in ascending powers of x.

A. 2^{59}

B. 2^{58}

C. 2^{30}

D. 2^{29}

Answer: B

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25. 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 $a_0 + a_2 + a_4 + \ + a_{2n}$.

A. $3^n + \frac{1}{2}$

B. $3^{3n} - \frac{1}{2}$

C. $\frac{3^n - 1}{2}$

D. $\frac{3^n + 1}{2}$

Answer: D

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26. If A and B are coefficients of x^n in the expansions of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ respectively, then A/B is equal to

A. 4

B. 2

C. 9

D. 6

Answer: B

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27. If $n > 1$ is an integer and $x \neq 0$, then $(1+x)^n - nx - 1$ is divisible by

A. nx^3

B. n^3x

C. x

D. nx

Answer: C

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28. Let the coefficients of powers of x in the 2^{nd}, 3^{rd} and 4^{th} terms in the expansion of $(1+x)^n$, where n is a positive integer, be in arithmetic progression. Then the sum of the coefficients of odd powers of x in the expansion is

A. 32

B. 64

C. 128

D. None of these

Answer: B

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29. Let $(1+x)^{10} = \sum_{r=0}^{10} c_r x^r$ and $(1+x)^7 = \sum_{r=0}^{7} d_r x^r$.

If $P = \sum_{r=0}^{5} c_{2r}$ and $Q = \sum_{r=0}^{3} d_{2r+1}$, then $\frac{P}{Q}$ is equal to

A. 4

B. 8

C. 16

D. 32

Answer: B

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30. The coefficient of x^{10} in the expansion of $1 + (1+x) + \ldots + (1+x)^{20}$ is

A. ${}^{19}C_9$

B. ${}^{20}C_{10}$

C. ${}^{21}C_{11}$

D. ${}^{22}C_{12}$

Answer: C

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Wb Jee Workout Category 2 Single Option Correct Type 2 Marks

1. The sum of the series $1+\frac{1}{2}{}^{n}C_1+\frac{1}{3}{}^{n}C_2+\ldots.+\frac{1}{n+1}{}^{n}C_n$ is equal to

A. $\frac{2^{n+1}-1}{n+1}$

B. $\frac{3(2^n-1)}{2n}$

C. $\hat{}\ \frac{2^n+1}{n+1}$

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

Answer: A

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2. If ${}^nC_0, {}^nC_1, \ldots, {}^nC_n$ denote the

binomial coefficients in the expansion of $(1+x)^n$ and $p+q=1$, then

$\sum_{r=0}^{n} {}^nC_r p^r q^{n-r} =$

A. 2^n

B. 2^{n-1}

C. 0

D. None of these

Answer: C

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3. The 4^{th} term from the end in the expansion of $\left(\frac{x^3}{3} - \frac{3}{x^2}\right)^7$ is

A. $315x$

B. $21x$

C. $105x$

D. None of these

Answer: C

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4. If $\frac{1}{\sqrt{2x+1}}\left\{\left(1+\sqrt{2x+1}\right)^n-\left(1-\sqrt{2x+1}\right)^n\right\}=a_0+a_1x+a_2x^2+.....$ then n must be equal to (A) 20,21 (B)21,22 (C)22,23 (D)none of these

A. 20, 21

B. 21, 22

C. 22, 23

D. None of these

Answer: B

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5. The middle term in the expansion of $\left(1-3x+3x^2-x^3\right)^{2n}$ is

A. $\frac{(6n)!}{(3n)!(3n)!}x^n$

B. $\frac{(6n)!}{(3n)!}x^{3n}$

C. $\frac{(6n)!}{(3n)!(3n)!}(-x)^{3n}$

D. None of these

Answer: C

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6. Let m, $\in$ N and $C_r = {}^nC_r$, for $0 \leq r \leq n$

Statement-1:

$$\frac{1}{m!}C_0 + \frac{n}{(m+1)!}C_1 + \frac{n(n-1)}{(m+2)!}C_2 + \ldots + \frac{n(n-1)(n-2)\ldots.2.1}{(m+n)!}C_n$$
$$= \frac{(m+n+1)(m+n+2)\ldots(m+2n)}{(m+n)!}$$

Statement-2: For r ≤ 0

$^{m}C_{r}\,^{n}C_{0} + {}^{m}C_{r-1}\,^{n}C_{1} + {}^{m}C_{r-2}\,^{n}C_{2} + \ldots + {}^{m}C_{0}\,^{n}C_{r} = {}^{m+n}C_{r}.$

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

B. $^{m+n}C_{n}$

C. $\frac{1}{(m+n)!}\left({}^{m+n}C_{n}\right)$

D. 0

Answer: A

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7. Write the remainder obtained when 1! + 2! + 3! + ... + 200! is divided by 14

A. 3

B. 4

C. 5

D. None of these

Answer: C

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8. The total number of terms in the expansion of $(x+2)^{102}+(x-2)^{102}$, if similar terms are taken together are

A. 51

B. 53

C. 54

D. 52

Answer: D

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9. The greatest integer less than or equal to $\left(\sqrt{2}+1\right)^6$ is

A. 198

B. 197

C. 196

D. None of these

Answer: B

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10. In the expansion of $(1+x)^{70}$, the sum of coefficients of odd powers of x is

A. 0

B. 2^{69}

C. 2^{70}

D. 2^{72}

Answer: B

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11. Number of irrational terms in the expansion of $\left(\sqrt[5]{2}+\sqrt[10]{3}\right)^{60}$ are

A. 54

B. 61

C. 30

D. 31

Answer: A

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12. If the co-efficient of x^{100} in $1+(1+x)+(1+x)^2\ldots\ldots\ldots+(1+x)^n$ is $201C_{101}$ then n equals

A. 202

B. 100

C. 200

D. 201

Answer: C

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13. If $S_n = \sum_{r=0}^{n} \frac{1}{nC_r}$ and $\sum_{r=0}^{n} \frac{r}{nC_r}$, then $\frac{t_n}{S_n} =$

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

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

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

D. None of these

Answer: A

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14. If $(1+x)^n = \sum_{r=0}^{n} C_r x^r$ then prove that $C_1 + 2C_2 + 3C_3 + \ldots\ldots + nC_n = n2^{n-1}$

A. $n.\ 2^n$

B. $(n+1).2^n$

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

D. $n.2^{n+1}$

Answer: C

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15. If $x + y = 1$, then $\sum_{r-0}^{n} rnC_r x^r y^{n-r}$ equals

A. 1

B. n

C. nx

D. ny

Answer: C

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Wb Jee Workout Category 3 One Or More Than One Option Correct Type 2 Marks

1. If x^n occurs in the expansion $\left(x+1/x^2\right)^n$, then the coefficient of x^m is $\frac{(2n)!}{(m)!(2n-m)!}$ b. $\frac{(2n)!3!3!}{(2n-m)!}$ c. $\frac{(2n)!}{\left(\frac{2n-m}{3}\right)!\left(\frac{4n+m}{3}\right)!}$ d. none of these

A. $\frac{(4n)!}{\left(\frac{4n-m}{3}\right)!.\left(\frac{8n+m}{3}\right)!}$

B. $\frac{(4n)!}{n!(4n-m)!}$

C. $\frac{(4n)!3!3!}{(4n-3)!}$

D. None of these

Answer: A

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2. If the coefficient of x^8 in the expansion of $\left(1+\frac{x^2}{2!}+\frac{x^4}{4!}+\frac{x^6}{6!}+\frac{x^8}{8!}\right)^2$ is $\frac{1}{M}$, then a divisor of M is

A. 2

B. 3

C. 5

D. 7

Answer: B::C::D

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3. If the coefficients of the rth, $(r+1)th, (r-2)th$ terms is the expansion of $(1+x)^{14}$ are in A.P, then the largest value of r is.

A. 15

B. 1

C. 9

D. 5

Answer: C::D

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4. Numerically the longest term in the expansion of $(3+2x)^{50}$, when $x=\frac{1}{5}$ is

A. 6^{th}

B. 8^{th}

C. 7^{th}

D. None of these

Answer: A::C

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5. If $C_0, C_1, C_2, \ldots, C_n$ are binomial coefficients, then $\sum_{k=0}^{n} C_k \sin kx \cos(n-k)x$ equals

A. $2^n \sin nx$

B. $2^{n+1} \sin(n+1)x$

C. $2^{n-1} \sin nx$

D. $2^{n+1} \sin nx$

Answer: C

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6. The range of values of the term independent of x in the expansion of $\left(x \sin^{-1}\alpha + \frac{\cos^{-1}\alpha}{x}\right)^{10}, a \in [-1, 1]$ is

A. $[1, 2]$

B. $(1, 2)$

C. $\left[\frac{{}^{10}C_5\pi^2}{2^{20}}, \frac{-{}^{10}C_5\pi^2}{2^5}\right]$

D. $\left[\frac{-{}^{10}C_5\pi^{10}}{2^5}, \frac{{}^{10}C_5\pi^{10}}{2^{20}}\right]$

Answer: D

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7. the value of x , for which the 6th term in the expansions of $\left[2^{\log}\_2\sqrt{9^{(x-1)}+7} + \frac{1}{2^{\frac{1}{5}}(\log)_2\left(3^{r-1}+1\right)}\right] is 84$, is equal to a. 4 b. 3 c. 2 d. 1

A. 0

B. 1

C. 2

D. 3

Answer: B::C

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8. The value of x, for which the ninth term in the expansion of $\left\{\frac{\sqrt{10}}{(\sqrt{x})^{5\log_{10}x}}+x.\,x^{\frac{1}{2\log_{10}x}}\right\}^{10}$ is 450 is equal to

A. 10

B. 100

C. $10^{-1/5}$

D. $10^{-2/5}$

Answer: B::D

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9. If $\left(1+2x+3x^2\right)^{10}=a_0+a_1x+a_2x^2+\ldots+a_{20}x^{20}$, then

A. $a_1 = 20$

B. $a_2 = 210$

C. $a_4 = 8085$

D. $a_{20} = 2^2 \times 3^7 \times 7.$

Answer: A::B::C

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10. The value of $\sum_{k=0}^{7} \left[\frac{\binom{k}{k}}{\binom{14}{k}} \sum_{r=k}^{14} \binom{r}{k}\binom{14}{r} \right]$, where $\binom{n}{r}$ denotes ${}^{n}C_{r}$, is

A. 6^7

B. greater than 7^6

C. 8^7

D. greater than 7^8

Answer: A::B

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Wb Jee Previous Years Questions Category 1 Single Option Correct Type 1 Mark

1. The number of solutions of the equation $x + y + z = 10$ in positive integers x, y, z is equal to

A. 36

B. 55

C. 72

D. 45

Answer: A

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2. Let n be a positive even integer. The ratio of the largest coefficient and the 2^{nd} largest coefficient in the expansion of $(1+x)^n$ is $11:10$. Then the number of terms in the expansion of $(1+x)^n$ is

A. 20

B. 21

C. 10

D. 11

Answer: B

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3. The value of sum $({}^nC_1)^2 + ({}^nC_2)^2 + ({}^nC_3)^2 + \ldots + ({}^nC_n)^2$ is

A. $\left({}^{2n}C_n\right)^2$

B. ${}^{2n}C_n$

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

D. ${}^{2n}C_n - 1$

Answer: D

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4. If the coefficient of x^8 in $\left(ax^2 + \frac{1}{bx}\right)^{13}$ is equal to the coefficient of x^{-8} in $\left(ax - \frac{1}{bx^2}\right)^{13}$, then a and b will satisfy the relation

A. $ab + 1 = 0$

B. $ab = 1$

C. $a = 1 - b$

D. $a + b = -1$

Answer: A

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5. The coefficient of x^3 in the infinite series expansion of $\frac{2}{(1-x)(2-x)}$, for $|x| < 1$, is

A. $-1/16$

B. $15/8$

C. $-1/8$

D. $15/16$

Answer: B

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6. The sum of the series $\sum_{n=1}^{\infty} \sin\left(\frac{n!\pi}{720}\right)$ is

A. $\sin\left(\frac{\pi}{180}\right) + \sin\left(\frac{\pi}{360}\right) + \sin\left(\frac{\pi}{540}\right)$

B. $\sin\left(\frac{\pi}{6}\right) + \sin\left(\frac{\pi}{30}\right) + \sin\left(\frac{\pi}{120}\right) + \sin\left(\frac{\pi}{360}\right)$

C. $\sin\left(\frac{\pi}{6}\right) + \sin\left(\frac{\pi}{30}\right) + \sin\left(\frac{\pi}{120}\right) + \sin\left(\frac{\pi}{360}\right) + \sin\left(\frac{\pi}{720}\right)$

D. $\sin\left(\frac{\pi}{180}\right) + \sin\left(\frac{\pi}{360}\right)$

Answer: C

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7. Number of irrational terms in the binomial expansion of $\left(3^{1/5} + 7^{1/3}\right)^{100}$ is

A. 90

B. 88

C. 94

D. 95

Answer: C

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8. In the expansion of $(x-1)(x-2)\ldots(x-18)$, the coefficient of x^{17} is

A. 684

B. -171

C. 171

D. -342

Answer: B

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9. If $1 + {}^{n}C_1 \cos\theta + {}^{n}C_2 \cos 2\theta + \ldots\ldots + {}^{n}C_n$ equals

A. $\left(2\frac{\cos(\theta)}{2}\right)^{n}\frac{\cos(n\theta)}{2}$

B. $2\frac{\cos^2(n\theta)}{2}$

C. $2\frac{\cos^{2n}(\theta)}{2}$

D. $2\frac{\cos^2(\theta)}{2}$

Answer: A

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10. Let $\left(1+x+x^2\right)^9 = a_0 + a_1 x + a_2 x^2 + \ldots\ldots + a_{18} x^{18}$. Then

A. $a_0 + a_2 + \ldots\ldots + a_{18} = a_1 + a_3 + \ldots\ldots + a_{17}$. Then

B. $a_0 + a_2 j + \ldots\ldots + a_{18}$ is even

C. $a_0 + a_2 + \ldots + a_{18}$ is divisible by 9

D. $a_0 + a_2 + \ldots\ldots + a_{18}$ is divisible by 3 but not by 9

Answer: B

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11. The number 101^{100} -1 is divisible by

A. 10^4

B. 10^6

C. 10^8

D. 10^{12}

Answer: A

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12. If n is an even positive integer, then find the value of x if the greatest term in the expansion of $1 + x$ ^n may have the greatest coefficient also.

A. $\frac{n}{n+2} < x < \frac{n+2}{n}$

B. $\frac{n}{n+1} < x < \frac{n+1}{n}$

C. $\frac{n+1}{n+2} < x < \frac{n+2}{n+1}$

D. $\frac{n+2}{n+3} < x < \frac{n+3}{n+2}$

Answer: A

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13. The number of irrational terms in the expansion of $\left(3^{1/8}+5^{1/4}\right)^{84}$ is

A. 73

B. 74

C. 75

D. 76

Answer: B

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